

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## The "Follansbee" Double Propeller Pump.

The almost innumerable variety of purposes requiring the raising of water and other liquids in large quantities and in many situations render the consideration of the point of economy of great importance. Even though it involve a large increase of complication and cost of construction, the form of apparatus which, by a wise adaptation of natural laws and mechanical principles, will elevate the largest quantity of water per pound of fuel for a given time and height is, beyond cavil, the best. This of course applies only to those devices whose percentage of saving is sufficient to pay within a reasonable time for an increased cost of construction, attendance, &c., as otherwise the saving would be only on one side of the account, and, like Franklin, we would "pay too dear for our whistle." But when a device, although carried to the extreme limit of simplicity and cheapness, is capable of performing a required duty with a material saving of cost, both as to power and attention, it possesses a double recommendation to favor, and its merits must eventually become known and appreciated. One of the most meritorious of the many excellent apparatus of the class under consideration, which comprised an important and interesting feature of the display in Hydraulic Annex to Machinery Hall at the Centennial, was the above mentioned "Follansbee" pump, an illustration of which is herewith presented. One of the great difficulties heretofore experienced in vertical propeller pumps has been the tendency of the column of water to follow the rapid rotary motion of the propellers, thereby partially neutralizing their lifting properties. This is overcome in a measure by the high rate of speed at which the propellers are revolved, but it involves two very serious evils, in that the increased velocity necessarily requires a proportionate increase of power, and also that as the rotation of the water is not stopped nor even decreased, the lift is simply in a ratio due to the difference between the velocity of the water and that of the propellers; and the unavoidable result is that the centrifugal force by throwing the water from the center leaves the latter hollow, thus producing a somewhat meager stream, when the actual square inches of section are considered. This, however, is not in comparison with other pumps, for there the propeller takes a high rank, but to demonstrate the great loss from the rotary motion of the water, which is the one fundamental defect to which may be traced all others which are peculiar to devices using the propeller principle. Mr. Follansbee's great desideratum in designing his pump was the prevention of any save an approximately vertical motion of the column, and the result shows not only that he accomplished his object in the most admirable manner, but also that his theory of the effect was not over-estimated. As will be presently demonstrated, the success of this pump is dependent solely upon this feature, to which are due the great saving of power through a reduced rate of speed, and the solid volume of water delivered, whose area of section is actually that of the discharge opening, and not minus a large percentage of hollow center. As the water is raised by the direct mechanical action of the screws, and is not dependent upon atmospheric pressure the lift of which the pump is capable is not limited. It is therefore made in short sections, and as many as necessary joined together to suit the required application. As regards simplicity and cheapness it may be stated that the greater part of the work required is done in the foundry—very little machine work being necessary. A reference to the cut will render so obvious the construction and operation of the pump, that any but the briefest explanation will be unnecessary. The casing or barrel of the portion containing the propellers is made in half sections, flanged on the ends and sides for the joint bolts. Along the inner edge of the flange is a groove for the reception of Tuck's or any similar round packing, upon which the joints are effectually and rapidly made. At the center of the length of section on the concave side is a bearing for the shaft on that side, leaving just sufficient space for the propeller upon the other. By means of an efficient coupling the shaft may be made of any required length, and, as the only finish necessary is for the journals, the expense and time necessary for the addition of one or more sections is inconsiderable. The attachment shown at the bottom does not contain valves, but is merely a grating or strainer to prevent the entrance of anything which is too large to pass the propellers. The shafts are driven by means of the pulleys shown at the top, and run in opposite directions, which, in connection with the peculiar form of the casing, is the whole secret of successfully preventing rotation of the water. Of course it is understood that the propellers on one shaft are right and on the other, left hand, and the tendency to rotation caused by the right would be effectually counteracted by the left. To show this point clear-

ly the largest of the three pumps comprising the exhibit had a hole drilled near the floor (about 6 feet from the surface of the water), and upon removing the plug the solid current could be seen rushing upward, with not sufficient centrifugal force to throw a drop through the opening. By holding the finger in the current its direction could be distinctly felt. The elevation and size of the stream thrown by this pump, when compared with the size of the belts by which it was driven, seemed almost incredible, and attracted much attention from practical men. In order to show the effect of the opposite motion of the propellers in preventing the rotation of the water, Mr. Follansbee started a 3 inch pump, which, although driven by a 1 and 1/4 inch belt, threw a perfectly solid stream through a 3 inch nozzle, which fell without the least sign of twist to the current back into the tank. One of the belts was then thrown off the pulley and the propeller stopped. The effect was instantaneous—the volume of water decreased to less than one-third, and left the nozzle with a swirl almost equal to that caused by a centrifugal dryer, wetting everything in its vicinity. The belt was then replaced on the pulley, and the propeller again started, when the stream almost instantly resumed its former solidity and volume. To show the quantity of water raised, as compared with the power used (as before stated, the machine was driven by two 1 1/4 inch belts), the stream was received by a small tank, having an overflow or wear 20 inches wide, the flow of water over which was 2 inches, making a volume of 40 square inches section, the velocity being what was due to gravity only. As there are no valves nor other parts to become obstructed, the pump will readily allow of the passage of foreign substances which are not too large to pass the propellers; therefore it is well adapted to raising such liquids or semi-liquids as paper pulp, tan bark, sand, &c., &c. Upon stopping the propellers the water instantly falls to the level of the surface, leaving the pump perfectly free and preventing damage from freezing in cold weather. The pump was awarded a medal and diploma at the Centennial. It is manufactured by the Lewiston Machine Company, of Lewiston, Me. The regular sizes manufactured are from 4 inch, having capacity of over 500,000 gallons, to 24 inch, of 25,000,000 gallons in 24 hours. Any particulars in regard to prices, &c., will be furnished upon application to Messrs. Kilvert & Tappan, general agents, corner Water and Congress streets, Boston, Mass.

## Swedish Iron.

In a recent article on Swedish iron, Prof. Ackerman, of Stockholm, says:

In proportion to the population, Sweden will soon be exceedingly well provided with railways, but if this were the case in a yet higher degree, her iron production, in respect to quantity, could scarcely become of any importance in comparison with that of several other countries; at least, unless some considerable beds of ironstone, hitherto unknown, are discovered in the neighborhood of the Scanian coal field, for only on this supposition can it be thought possible to produce in Sweden iron cheap enough to meet with an almost unlimited demand. In the absence of any such discovery in Skone, on the contrary, there can never, on account of the expense, be any question of producing in this country what is called in the market of the world "ordinary" iron, but Sweden must continue to confine herself to the manufacture of the so-called "quality" iron. But even if circumstances were so favorable that a relatively unlimited demand could be found for such dearer iron, an iron production grounded exclusively on forest products as fuel is so much the less attain to any large amount according to present ideas, as the growth of wood here, especially in the more northern parts of the country, is much slower than in many other countries. In proportion as forest products, in consequence of increased facilities of transport, become more valuable, the forests ought indeed to be better managed, and the

yield of wood would then be much greater than is the case now; for of the more remote tracts of forest it may, unfortunately, in general be said that the people there have up to this time not given the slightest attention to the renewed growth of the wood; but even if this were properly attended to, it is yet an impossibility to attain to any iron production on a great scale by means of charcoal. For every tunland of forest in the parts of our mining districts where it is best managed yields only 52 cubic feet (3.75 cubic meters per hectare) solid wood yearly, while a tunland of forest as commonly managed by the Swedish peasant-

A way to utilize such surplus ores, for which the supplies of charcoal are insufficient, would be to smelt them with English coke, and afterward to refine by the Bessemer process the pig iron thus produced. A Bessemer product thus manufactured would not, indeed, be of so good quality as if made from the same ores with charcoal, but, notwithstanding, it ought to be always good enough for rails and tires, &c. A new iron work, Oscarschutt, which is intended for the manufacture of pig iron with English coke, and for the direct production from the pig of Bessemer metal, has also been erected lately by a German company at Morgongofva, but owing to the bad times it has not yet been put in work.

## Tempering Spring and Tool Steel.

If steel is heated to redness and allowed to cool slowly, it becomes nearly as soft as pig iron, and can be as readily worked. If, however, when so heated it is suddenly cooled, as by plunging it into water it becomes very hard and brittle. Between these two extremes almost any degree of hardness may be given steel, and in diminishing its hardness to that point that has been shown to be the best for certain uses consists the art of tempering. With the explanation that seems almost unnecessary, that in tempering the steel is made very hard, and then its hardness reduced by heating it to a certain point indicated by the color of the steel, or, if heated in oil, by the color of the smoke or by flame, we give some rules to be observed in tempering. 1st. The steel should be very hard before tempering. If the articles to be tempered are not properly hardened at first it will be time and labor lost to temper them. 2d. The heat for tempering should not be too suddenly applied. The slower the heating the tougher and stronger the steel. 3d. The most careful and experienced workman is liable to be deceived in the color of the steel, and consequently in the temperature in an imperfect light or at twilight. 4th. Where water is used for plunging the steel in, the less frequently it is changed the better, provided it does not get greasy. The temperature to which the steel should be raised for various purposes is shown by the color of the steel when heated. Lancets which must be very hard in order that they may be ground to a keen edge, are tempered to the faint yellow tinge, equal to 430° F., while razors and surgical knives, which must be less easily broken, are tempered to the straw yellow, equal to 450° F. Pen knives are tempered upon an iron plate over the fire, the blades being laid upon it on their backs until they have acquired the full yellow color, equal to 470° F. Cold chisels and large shears for cutting iron must stand rougher usage, and are therefore tempered to a brown yellow, equal to 490° F., while the brown with purple spots, equal to 510° F., marks the tempering heat for axes and plane irons. Table knives are heated till they acquire a purple color, equal to 530° F., in order to let them down to the proper temper, and articles in which great elasticity is required, such as swords and watch springs, are tempered to a bright blue, equal to 550° F., while saws are brought to the highest tempering heat at which the dark blue color shows itself. This temperature, about 600° F., is that at which oil boils and inflames, so that a bath of oil is

very frequently used in tempering, the articles being immersed in it and the temperature ascertained either by a thermometer or by the volume and color of the smoke which rises from the oil. Some tools are annealed by plunging them into oil heated to 400° F., and allowing them to cool down in it. Small steel tools, after being hardened by chilling in water, are coated with tallow heated over a flame till the tallow begins to smoke, and then stuck into cold tallow. Large steel implements are let down to the proper temper by being heated in a kind of oven known as a muffle.

**Improvement in Mining Machinery.**—An apparatus, invented in Belgium, for sinking and tubing mining shafts, is said to have proved very efficient, as compared with other usual

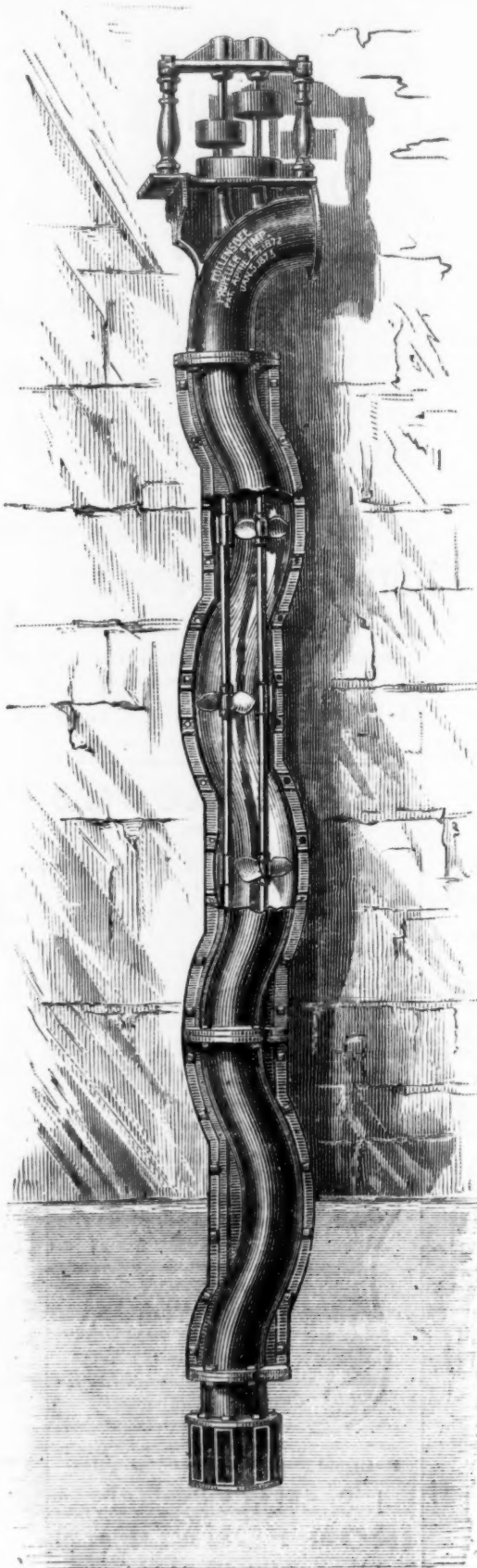
methods, being also more economical, and can be successfully used where all other resources have failed. The device consists of a wrought iron trepan or borer, weighing 15 tons, and having a diameter or rather a length of about six feet, and armed with sharp steel teeth. This is worked by a balance beam up and down, being turned in each descent until it bores a round hole of six feet in diameter and 10 yards in depth. Another trepan, weighing 25 tons or more, is then attached to the rod and worked in the same way until the cylindrical excavation is prolonged to the same depth and increased to not less than 12 or 18 feet in diameter. The dirt is hauled out of the mine by an iron bucket with a valve bottom, which goes down open and closes when drawn back, while the iron tubing is let down in circular sections, so attached to a false bottom that they float in the water—which always fills a shaft, and with this machine rather assists than retards the work—until, by a simple arrangement the tubing is gradually let into its place. Numberless grappling irons, which are only used in case of accidents, accompany the shaft borer, and nothing which can occur to interfere with a successful working of the apparatus is lost sight of. Indeed, so effective is the operation of this new apparatus found to be, that it has already been employed in sinking more than 40 previously abandoned shafts, and is also said to be particularly valuable in cases where quicksands and water prove by the ordinary methods unmanageable, the borer needing no assistance below the earth's surface until the shaft is completed.

## An Improvement in Bessemer Converting Vessels.

An invention which promises to be of importance in relation to the bottoms of the converters used in the Bessemer process for the conversion of cast iron into malleable iron and steel, has been patented by Mr. John Collins, of Bolton, England. It has for its object the constructing of the bottom in such a manner as to render the wear and tear in use more uniform, to reduce the cost, and prolong the "life" of the "bottom," while saving the time expended in frequent renewals. In order to effect these objects he dispenses with the use of previously prepared fire-clay tuyeres, and forms a homogeneous bottom with the tuyeres in one therewith, and he employs a more highly and uniformly refractory mixture as a material, and further adopts an improved method of preparing the bottom. In carrying out the invention he selects a highly silicious rock, such, for example, as that used in the manufacture of the best silica bricks, and grind it to a uniform coarseness adapted for the purpose. This rock, which is known as a millstone grit or gannister, should contain not less than, say, 92 per cent. of silica. He prefers the "lychreda" rock for the purpose. To this ground rock he adds by preference, say, from 3 to 12 per cent. of well selected and washed fire-clay.

A special arrangement is made for molding the bottom. He prepares a molding box corresponding in internal size and shape to the bottom, and capable of resisting a pressure of, say, at least 2 tons to the square inch, without fracture. This box is provided with a loose bottom plate, and he prepares a top plate to fit inside the box, which latter plate is furnished with taper studs of the diameter and number required by the special circumstances of the blowing to be effected by the vessel—that is to say, corresponding to the tuyere holes to be produced. The studs are made of a taper sufficient to clear well, and are also formed with a slight twist or spiral in their length. The length is such as to pass through the bottom in the direction of its thickness, and to leave a margin. He then fills the box so prepared with the mixture or material above described, and fits on the lid, and subjects the whole to the action of a powerful hydraulic press (applying a pressure of, say, not less than 2 tons to the square inch), and immediately imparts a slight turn to the studs by suitable mechanical means, while the mixture is under the said pressure. He then removes the pressure, withdraws the studs and the box, and subsequently stoves the bottom for a period of, say, not less than 48 hours, after which the bottom is ready for use.

**Blowers.**—Improved blowers have within a few years been adopted in many smithshops, and the leather bellows—which was once so characteristic a feature of the wagon and horse-shoers' shops—is rapidly becoming a thing of the past. The modern blowers are operated by hand, foot, or very frequently by steam-power, and the principal advantages which they possess over the old bellows are: First, great economy of room; second, durability; third, the production of a force blast that can be varied according to the requirements of the work in hand; fourth, saving in fuel, owing to more perfect combustion; and, fifth, great saving in time, as the operator has more perfect control over the fire, which can be rekindled and the heats taken in a much shorter time than is possible with the bellows.



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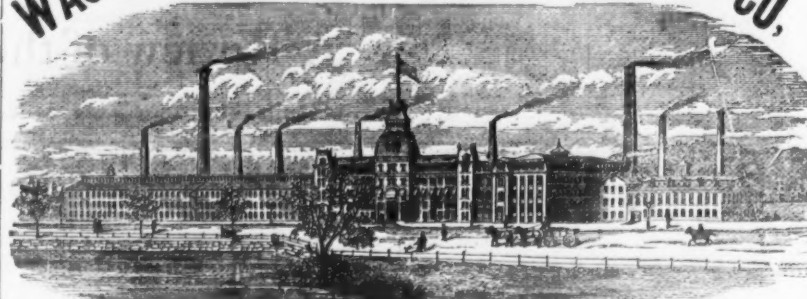
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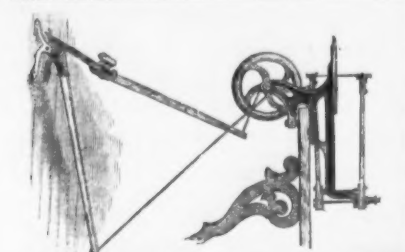
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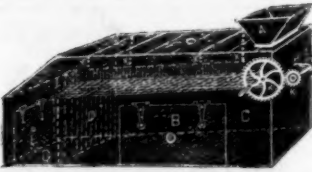
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Territory or right to manufacture  
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REDUCED TO \$7.50 PER DOZ.

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water, hot or cold.  
Are Durable, Light, Strong  
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hoops, and will not absorb  
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dress,  
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Economy is Wealth.



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Manufacturers of and Dealers in

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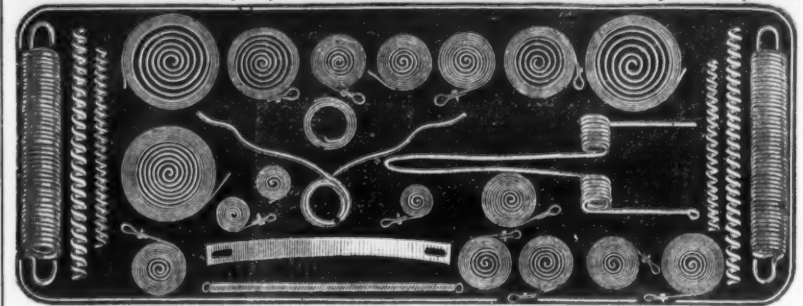
Proprietors of

**CHISHOLM'S PATENT ASH-SIFTER**

In offering this machine to the public, we would state that no fear need be entertained as to its durability, great care having been taken in the manufacture. The wood used is of the best quality of matched pine, and made in such manner as to prevent any dust from escaping when the sieve is being worked. The cog-wheel Ash-Sifter should be used by all having the care of Boilers, Furnaces, &c., and are likely to supplant all others. We claim it will do the work of any five machines now in use. It is always ready; can be worked backward and forward. Ashes to be sifted are placed in the Hopper on top of the Sieve, which we will designate as A. The weight of the ashes opens a trap door under the Hopper and enters the Sieve, which is suspended on an angle by double-jointed hooks. X K is a large cog-wheel fastened on the side of Sifter, and connects with one-fourth its size, which is secured on a crank shaft, and connects an arm with the Sieve. B, Ash-box door; C, Ash-box; D, partition that separates the coal from the ashes; E, the coal-bin door; G, coal-bin. L is the opening where the coal slides into the bin while being sifted; F, door on top to take out clunkers, &c. With one revolution of the cog-wheel K, we get from ten to fourteen motions of the Sieve. We make three sizes: No. 1, three and a half feet long, two feet six inches wide, and twenty inches high, price, \$35; No. 2, four feet long, thirty-three inches high, and two feet wide, price, \$30; No. 3, four and a half feet long, three feet high, and two feet wide, hopper to hold one-half barrel, sifting it in less than one minute, price, \$35. Reference can be had upon application to parties now using the sifter. All Sieves warranted to give satisfaction.  
**HORAN BROS.**

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Manufacturers of  
STEEL WIRE for all purposes, and STEEL SPRINGS of every description.



Market Steel Wire, Crinoline Wire, tempered and covered.  
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AWARDED NOV 21, 1874.

## Cherry Heat Welding Compound.

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This compound is put up and warranted genuine only in 1, 5, 10, 50 and 100 lb. packages, and can be obtained from the manufacturers direct, or from the following General Agents at manufacturers' prices, in large or small quantities:

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PARKHURST & WILKINSON, Chicago, Ill.  
GEORGE D. HALL, St. Louis, Mo.  
H. R. IVES & CO., Montreal, Prov. of Quebec.

It is also for sale in 1, 5 and 10 lb. packages by Hardware Dealers generally throughout the country.

## PERFECT COMBUSTION BY AN OXYGEN BLAST.

By this process oxygen is imparted to the blast simply by its passage, on its way to the place of combustion, through a chamber or vessel holding an oxygen compound, from which, by the agitation of the air therein, oxygen is set free and thus imparted to the blast. The required volume of this blast is one-half less. The combustion becomes perfect therefrom, all the carbon in the fuel being converted into a high and concentrated heat, without smoke or gas, but that of carbonic acid, being formed. Beside a saving of fuel, obtainable in all cases by this blast, advantages arise from it varying according to the appliance of the heat. —On Forge Fires it gives a clean and intense heat, free from all sulphurous gas, whereby a better and quicker welding is had and time saved. On fires under boilers for making steam, the saving in fuel is 25 per cent. and over, the working capacity can be increased in same ratio by reason of the intensified and accelerated combustion, which latter also overcomes the disadvantages connected with the use of fine dust and impure coal. Castings from a cupola in which the fire is sustained by this blast become of superior quality, uniformly soft to work and very tough, resembling wrought iron and steel; they forge hot and cold to some extent; the iron becomes strengthened and purified, being freed from carbon and sulphur. For blast furnaces this process becomes of vast importance—it saves fuel, increases the working capacity, perfects and reduces the cost of the metal, makes sulphurous and other impure ores fit for use. The serious drawbacks arising from imperfect combustion, caused mainly by otherwise uncontrollable atmospheric influences, are overcome. The work of a puddling furnace and that of decarburizing the iron, both for wrought iron and steel purposes generally, is much simplified, shortened and perfected as to purity of product; the work of so many hours is reduced to as many minutes by this process. The process has the merit of being simple and easily applied, and with but very little expense, and this only for the needed chamber or vessel and its connection with the blast pipe; the vessel may be a wooden keg, barrel or larger cask or tank, properly lined, from two gallons for a single forge fire up to 500 gallons and over, according to the blast in use. The cost of the oxygen is conditioned by, and made subject to, its effect—it is but a small item compared to the gains from it. Although this process has been in practical use for over a year, the inventor felt reluctant to offer it to the public before having its utility and practicability fully established, beyond any and all contingencies, not from a theoretical standpoint, but from the testimony of manufacturers who have used the process this last year, and whose standing and reputation as manufacturers are of the highest order, and such as to entitle them to the consideration of others. For further information, and for small specimens of castings from this process, address:

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## O. LINDEMANN & CO.,

Manufacturers of  
JAPANNED AND PATENT BRIGHT METAL

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Nos. 252, 254 & 256 Pearl Street,  
NEW YORK.

Importers of GERMAN TEA TRAYS in  
four colors. Catalogues and Price Lists  
furnished to the Trade only.



## A Monument to Grit.

The grindstone trophy, of which we present an illustration, was one of the novelties of the Centennial Exhibition. It was exhibited by Mr. J. E. Mitchel, of Philadelphia, and was composed wholly of grindstones, such as are used in workshops and factories. The column was 26 feet high, and consisted of 36 stones of different grit. Grouped about it were various styles of grindstones, weighing from 1000 to 4000 lbs., used for grinding saws, file blanks, edge tools, table cutters; also bead stones for nail works and locomotive shops. The trophy was unique and not without beauty. Mr. Mitchel is an authority on the subject of grindstones and their use, and has given us the best literature which the subject has, as our readers will remember.

## Reduction of Molders' Wages at Troy.

The Troy (N. Y.) Times, of the 21st ultimo, says:  
For many years up to a recent date the city of Troy, if not the leading stove manufacturing city in the country, was one of the first, and hundreds of men were afforded employment and gained a livelihood for themselves and their families in that branch of industry. "The molders' union of this city was the largest in the country. Gradually this important manu-

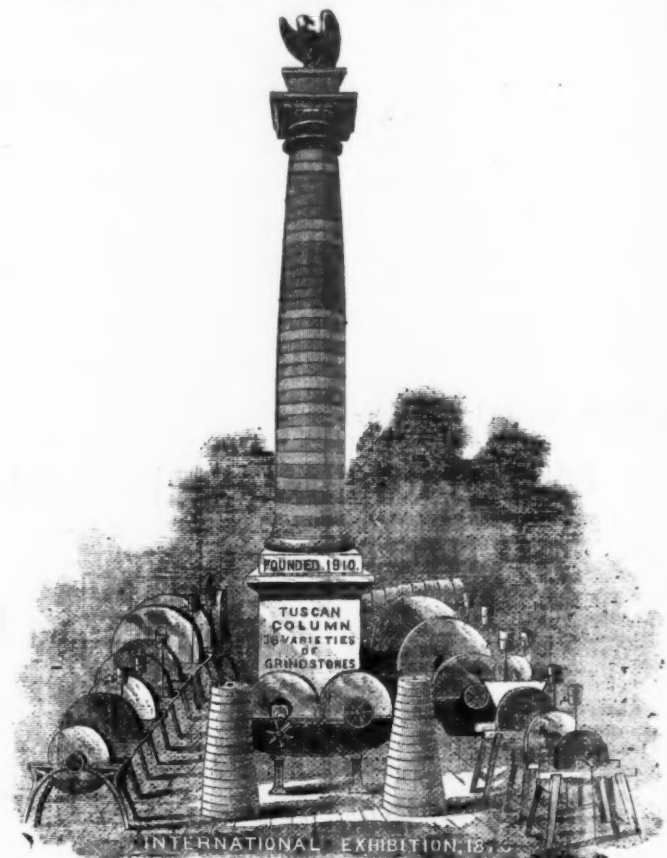
in the different shops as speedily as possible. Employees desiring to continue with us will give their names to the respective foremen, from whom they can learn prices and terms upon which they can obtain work."

## Workshop Surroundings.

The Mining and Scientific Press supplements our recent article on "Comfortable Workshops" with one on workshop surroundings, from which we quote as follows:

A little disposition on the part of owners, in respect to the comfort of those who look to them for employment, will create a tie of interest that will be reciprocal, and each will feel that the other is necessary for his support, and that they cannot well succeed if separated. As a rule, employers pay too little attention to cheerful surroundings for their employees, in any branch of business. There are exceptions, of course, and it is well to note that where these exceptions occur a more prosperous general appearance is manifest.

There are but few workshops that may be said to be attractive in their surroundings. The majority of them are dark, crowded, dreary places, where a staid stint of labor is performed according to a pre-arranged agreement, for which a stipulated price is paid. Beyond this there is but little in the majority of our workshops, and were it not for the daily



A GRINDSTONE TROPHY.

facture has been deteriorating here. Stove foundries have been erected in the West, and a large section of country which was formerly supplied by Troy manufacturers now looks to localities nearer home for the productions of this industry. It is said, with how much truth we cannot vouch, that during the past few years it has cost more to manufacture stoves in Troy than in any other city in the Union—that labor is higher here, and that, consequently, this extra burden has given the competing manufacturers of other cities great advantage over our own in the sale of goods. The cause of the depression in the stove trade of Troy may be a matter of dispute; but the fact of the existence of such depression remains, nevertheless, and must be faced, and if possible, overcome. There are a great many hundreds of thousands of dollars invested in the stove business in this city. It will not do to sacrifice this property and lose the benefits it secured to us as a community in promoting the general welfare. There are also hundreds of mouths to be fed by the proceeds of labor in this department of trade and human activity. These mouths must not be left to want, nor should the men, women and children they represent be driven from the city. There are ways by which the stove trade of Troy can be retained, and the old prosperity brought back. The facilities for conducting the business here are as good as any in the land. Mutual concession, forbearance, and the adoption of common sense views in the contest between capital and labor (to use a much abused term) will have a happy effect in solving the difficulties of the situation and restoring a reasonable degree of prosperity to all concerned.

Fuller, Warren & Co. are the largest stove manufacturers in this city. The firm is also one of the oldest and most extensive in their operations in the country. It has been a very successful concern, and always, we believe, generous to its employees. The following notice, posted in their shops yesterday, serves to show the difficulties that Messrs. Fuller, Warren & Co. have had to encounter, and the means by which they hope to overcome them. We understand that other manufacturers will follow their example:

"These works will be closed on Saturday night, November 25, 1876. In consequence of the great competition in the manufacture of stoves and heaters which meets us at every point, and will inevitably destroy our business unless we can produce our wares more cheaply, we have concluded to make a general reduction of wages, including all foremen, journeymen, apprentices and laborers in our employ. On and after December 4, 1876, work will be resumed

only of want there would be no incentive to labor. We have seen workshops that were dark and damp, destroying the health and buoyancy of the spirits of the operatives, when a small sum, perhaps, would add not only warmth and light, but fill the place with pleasant surroundings. The surroundings of the place of labor have more influence upon the operative than many are aware of. Give a mechanic clumsy tools to work with, a rough dirty bench to work upon, imperfect light, scarcely elbow room, and but little care exercised if he have proper ventilation and warmth, and he will become careless, his work partaking of the surroundings in which he is placed. He will think more of getting his wages at a certain time than the completion of his work. A few years of this experience will spoil almost any workman, no matter how good he may be.

But give him, on the contrary, good tools to work with and a nice place in which to perform his labor, and he will instinctively take more pains with it than in a bad and ill arranged apartment. In a pleasant room, he will, of his own accord, keep his tools and work in order, and more cheerfully perform the task assigned him. A kind of magnetic influence of the surroundings will infuse itself into the operative, and his work will partake of that nature and go from him stamped with the impress of the influence thus created.

There is no reason why the place of business should not be surrounded with pleasant influence as well as the home. Most of a man's active life is passed in his place of business, and why it is kept so severely unattractive is a mystery to many. The shop is certainly the mine from which he draws his wealth, and might he not spare a small sum to make it attractive to others and himself also?

This carelessness on the part of employers is by no means confined to them in workshops alone. It is apparent in almost every branch of industry. The workmen are too often looked upon as mere machines, who require no other incentive to labor than wages promptly paid. Wages are, of course, the prime incentive to labor, but other things must be taken into consideration when good work is expected. There must be harmony between employer and employee, or the employer does not get as much for his money as he otherwise would. Looking at it from a mere financial standpoint, it would be infinitely better for employers to pay more attention to the comfort of employees than is usually the case. It makes the greatest difference possible whether a whole business runs smoothly or not; and to make it run smoothly in all departments the employees must be satisfied that their employers look to their comfort as well as the result of their labor.



Iron. NEW YORK.	Iron. NEW YORK.	Iron. NEW YORK.	Iron. NEW YORK.	Iron. PITTSBURGH.
<b>OGDEN &amp; WALLACE,</b> Successors to GAN'L G. SMITH & CO., <b>IRON &amp; STEEL,</b> 85, 87, 89 & 91 ELM ST., N. Y. <b>COMMON AND REFINED</b> <b>BAR IRON.</b> SHEET AND PLATE IRON, HOOP, BAND AND SCROLL IRON, Rod and Horse Shoe Iron, Angle and T Iron, Sweden and Norway Iron, Norway Nail Rods. Iron of all sizes and shapes made to order.	<b>G. HUERSTEL,</b> <b>IRON and STEEL.</b> Warehouse, 99 Market St., N. Y. Branch Store at 213 E. 23d St., 5 doors east of 84 Ave. <b>IRON AND STEEL OF ALL KINDS</b> Constantly on hand. Horse Shoe Iron and Nails, Nor- way Iron, Cast Spring, Top Calk, and Bessemer Steel Tire. Also, SPRINGS, AXLES AND BOLTS, For Truck and Carriage Makers.	<b>T. D. HAZARD,</b> BROKER IN <b>NEW &amp; OLD RAILS,</b> Foreign and Domestic <b>PIG IRON,</b> Wrought and Cast Scrap Iron AND GENERAL METALS. 204 Pearl St., New York.	<b>HARRISON &amp; GILLOON</b> <b>IRON AND METAL DEALERS,</b> 558, 560, 562 WATER ST., and 902, 904, 906 CHERRY ST., NEW YORK. Have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Cast Wheels, Axles and Heavy Wrought Iron; also old Copper, Composition, Brass, Lead, Pewter, Zinc, &c.	<b>PENNSYLVANIA IRON WORKS.</b> <b>EVERSON, MACRUM &amp; CO.</b> Pittsburgh, Pa. Manufacturers of every description of <b>Bar, Sheet and Small Iron,</b> Make a specialty in <b>Fine and Common Sheet Iron.</b>
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<b>A. R. Whitney &amp; Bro.,</b> Manufacturers of and Dealers in <b>IRON,</b> 58, 59 & 60 Hudson, 19, 50 & 52 Thomas, and 12, 14 & 16 Worth Sts., Our specialty is in <b>Manufacturing Iron</b> Used in the Construction of <b>Fire-Proof Buildings, Bridges, &amp;c.</b> AGENCY OF Robert Iron Co. Boiler Plate & Tank Iron. Glasgow Tube Works Boiler Plate. Pottsville Iron Works Shaping. Pottsville Rolling Mill Angles and Tees. A. R. Whitney & Bro.'s Elbows. Whitney's Best Bar Iron. Pottsville Rolling Mill Wrought Iron Beams and Channels Iron. Pottsville Rolling Mills. Books containing Cuts of all iron now made, and Sam- ple Pieces at office. Please address 58 Hudson Street.	<b>MARSHALL LEFFERTS</b> 99 Beckman St., New York, MANUFACTURER OF <b>AMERICAN</b> <b>Galvanized Sheet Iron,</b> AND AGENT FOR THE Easton Sheet Iron Works, Easton Pa. MANUFACTURER OF Best Bloom, Charcoal & Refined Sheet Iron. Galvanized Telegraph and Fence Wire Galvanized and Tinned Roofing and Siding Nails. Galvanized Hoop Iron of all widths. Galvanized Staples. Corrugated Iron for Roofing, plain or gal'd. Galvanized Bars and Chains for Cemetery Railing. Tin Plates, Spelter, and other Metals.	<b>Fuller, Lord &amp; Co.,</b> <b>BOONTON IRON WORKS,</b> 139 Greenwich Street, New York. <b>Swedish &amp; Norway Iron.</b> A Variety of Brands, including (IB) (14) (HP) (N.B.) (03) <b>BAR</b> suitable for Steel of all grades, Wire, Shovels, Hoes, Scythes, Carriage Bolts, Nail Rods, Tacks, &c. <b>CHARCOAL PIG IRON</b> for Bessemer and Car Wheels. <b>TRUCK BARS</b> for Steel Smelting and Re-rolling. <b>SCRAP or BAR ENDS.</b> Direct Agency for N. M. HÖGLUND, of Stockholm, represented in the United States by <b>NILS MITANDER,</b> 69 William St., New York, and 24 Congress Street, Boston. ALBERT POTTS, Philadelphia, Pa., AGENT.	<b>"Burden Best"</b> <b>Iron</b> <b>Boiler Rivets.</b>	<b>BOSTON ROLLING MILLS</b> Manufacture Extra quality small Rods, from best selected Scrap Iron. <b>SWEDISH AND NORWAY SHAPES,</b> Nail and Wire Rods. Also, <b>Horse Shoe Iron, Hand Made</b> <b>Horse Shoes &amp; the Boston</b> <b>Horse Shoe.</b> BOSTON ROLLING MILLS, W. R. ELLIS, Treas. Office, 17 Battery March St., Boston.
<b>Go to BRASS GOODS MFG. CO.,</b> 280 Pearl Street, N. Y., for <b>CARDS</b> Indestructible Business silver Trade Dollar printed Back Mirror Gold Twenty Dollar Gold Back Mirror Useful besides being Also all kinds of Press or Die work done cheaply, satisfactorily, promptly and well.	<b>LEFFERTS</b> <b>ENAMEL WORKS,</b> 417 W. 24th St., N. Y. Signs, Door, Number and Finger plates enameled in any color and decorated in any style. Illustrated Catalogues furnished on application. Plumbers' Materials, and every description of Wrought and Cast Iron Work enameled to order. <b>DANIEL F. COONEY,</b> (Late of and Successor to Jas. H. Hildane & Co.) 38 Washington St., N. Y. <b>BOILER PLATES and SHEET IRON,</b> <b>LAP WELDED BOILER PLATES.</b> Boiler Rivets, Angle & T Iron, Cut Nails & Spikes. Agency for Pottstown Iron Co., Vindicator Iron Works, Lebanon Rolling Mills, Pine Iron Works, Laurel Iron Works, The Bergen Rolling Mills, at Jersey City.	<b>Dan'l W. Richards &amp; Co.,</b> Importers of and Dealers in <b>SCRAP IRON,</b> <b>Pig Iron,</b> <b>OLD METALS.</b> 88 to 104 Mangin Street, Foot of Stanton St., E. R., NEW YORK.	<b>Burden Iron Works, H. Burden &amp; Sons</b> Troy, N. Y. <b>Pottsville Spike, Bolt and</b> <b>Nut Works.</b> <b>G. D. ROSEBERRY,</b> Pottsville, Pa. Manufacturer of <b>RAILROAD SPIKES,</b> <b>MINING SPIKES,</b> Cold Pressed Nuts, Machine Bolts & Bolt Ends	<b>ASA SNYDER,</b> Importer of Scotch, and Furnace Agent for the cele- brated Anthracite and Hot and Cold Blast Charcoal <b>PIC IRONS.</b> OFFICE AND YARD: 1008, 1010, 1012 and 1014 Cary Street, Richmond, Va. Orders for Scrap Iron filled.
<b>BORDEN &amp; LOVELL,</b> <b>Commission Merchants</b> 70 & 71 West St., New York. Agents for the sale of Fall River Iron Co.'s Nails, Bands Hoops & Rods, AND Borden Mining Company's Cumberland Coals.	<b>JOHN CARVER,</b> Manufacturer of <b>Caulking Irons,</b> <b>COTTON, FREIGHT &amp; Hay Hooks, &amp;c</b> 288 Monroe Street, NEW YORK.	<b>B. F. JUDSON,</b> Importer of and Dealer in <b>SCOTCH AND AMERICAN</b> <b>Pig Iron,</b> Wrought & Cast Scrap Iron, English and American <b>HORSE SHOE IRON, &amp;c.,</b> 457 & 459 Water St., and 235 South St., NEW YORK.	<b>Troy Polishing Works.</b> <b>STOVE ORNAMENTS</b> A Specialty. No. 641 River Street, TROY, N. Y. THOS. A. ELGIE, Agent.	<b>OSCAR BARNETT,</b> <b>Malleable &amp; Gray Iron</b> <b>FOUNDRIES.</b> NEWARK, N. J. <b>Black or Magnetic Sand,</b> For sale in any quantity, cheap, by <b>E. B. ESTES, 276 Pearl Street, N. Y.</b>
<b>Wm. Borden,</b> <b>L. N. Lovell,</b> Agents for the sale of Fall River Iron Co.'s Nails, Bands Hoops & Rods, AND Borden Mining Company's Cumberland Coals.	<b>GEORGE THORN,</b> Manufacturer of <b>Gasometer</b> and <b>Smoke Stack</b> <b>RIVETS,</b> Bolts, Nuts, Lag Screws, Washers, &c. 151 Centre Street, N. Y.	<b>P. W. GALLAUDET.</b> Banker and Note Broker, Nos. 3 and 5 Wall Street, NEW YORK. HARDWARE, METAL, IRON, RUBBER, SHOE, PAPER AND PAPER-HANGINGS, LUMBER, COAL AND RAILROAD PAPER WANTED. ADVANCES MADE ON BUSINESS PAPER AND OTHER SECURITIES	<b>RANCOCAS FACING MILLS.</b> <b>J. W. PAXSON &amp; CO.,</b> 514, 516, 518 Beach St., Phila., Proprietors. Also Dealers in <b>FOUNDRY SUPPLIES,</b> <b>And all Grades of MOULDING SAND.</b>	<b>CUTLER &amp; BROWN,</b> Shippers and Dealers in all grades of <b>MOULDING SAND.</b> FIRE SAND, FIRE CLAY & KAOLIN. Also, manufacturers and dealers in <b>FOUNDRY FACINGS and SUPPLIES.</b> Office, 288 Cherry Street, N. Y. Sand Banks at Albany: Retail Yard, 484 Cherry Street Factory, 215 & 217 Cherry Street. GEORGE W. CUTLER CLARENCE J. BROWN
<b>WILLIAM H. WALLACE &amp; CO.,</b> <b>IRON MERCHANTS</b> Cor. Albany & Washington Sts., NEW YORK CITY. Wm. H. WALLACE. Wm. BIRMAN	<b>THOMAS J. POPE &amp; BRO.</b> <b>BORAX</b> Of Finest Qualities. METALS. 292 Pearl Street, near Beckman, N. Y. Anthracite, Charcoal and Scotch Pig Irons, Ingot Copper, Lead, Blenuth, Tin, Antimony, Aluminum, Spelter, Nickel, &c., &c.	<b>SPENCER &amp; UNDERHILL,</b> 54 Beckman St., N. Y., Agents for American Screw Co., Wood Screws, Hand Rail Screws, Stove Bolts, &c. <b>O. Ames &amp; Sons,</b> Shovels, Spades and Scoops. <b>A. Field &amp; Son,</b> Tacks, Brads &c. <b>G. F. Warner &amp; Co.,</b> Metal Clamps and an as- sortment of Builders' Hardware.	<b>WHITEHEAD BROS.,</b> Office and Retail Yard, 517 WEST 15TH STREET, NEW YORK. Dealers in all grades NEW JERSEY, NORTH RIVER, CRESCENT AND ALBANY <b>MOULDING SANDS.</b> Also FIRE SAND, FIRE CLAY, KAOLIN and all kinds of <b>FOUNDRY FACINGS.</b>	<b>THE PASSAIC ROLLING MILL CO.,</b> Manufacturers of BEAMS, CHANNELS, ANGLES, TEES, And other shapes of iron used in construction of Buildings and Bridges. Contracts made for the material and erection of all classes of iron work and estimates, plans and specifications furnished under charge of competent engineers.
<b>SOUTHERN HOLLOW WARE,</b> Manufactured by <b>JESUP &amp; STERLING,</b> (Successors to Blackwell & Burr.) 7 & 9 CHIEF Street, (near John), New York. Proprietors POCASSET IRON WORKS, established 1824. Agents HARRISBURG NAIL WORKS. 202 and 204 Railroad Supplies, Burden's Horse Shoes, Brunswick, Essex, Tinned and Plain Ware.	<b>GRATE</b> <b>BAR</b> <b>"ECONOMY."</b> <b>GEO. VANDERBILT,</b> Sole Agent. Especially adapted for burning Pea Coal, Peas and Dust, and other fine material. Office, East West 19th Street, New York.	<b>STEEL STAMPS.</b> LETTERS, FIGURES, &c., Of every description and for all purposes. Best Work, Lowest Prices. <b>RICHARD H. ROGERS,</b> 43 Ann St., (near), New York. Orders by mail promptly attended to. <b>NAME PUNCHES.</b>	<b>BAEDER, ADAMSON &amp; CO.</b> Manufacturers of <b>SAND &amp; EMERY PAPER &amp; EMERY CLOTH.</b> (Also, in Rolls for machine work.) Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felt- ing for Covering Boilers, Pipes, &c., Cow Hide Whips. STORES: <b>PHILADELPHIA, 730 Market St.,</b> <b>NEW YORK, 67 Beekman St.,</b>	<b>WATTS COOKE, President.</b> <b>W. O. FAYERWEATHER, Treasurer.</b> <b>NEW YORK OFFICE, No. 138 Chambers Street.</b> <b>Paterson, N. J.</b>



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**T. Horace Brown,**  
IRON, METALS & MINERALS,  
205½ Walnut St., PHILADELPHIA.

AGENT FOR  
Bechtelsville Iron Co.,  
Wood Bros.' Charcoal Blooms & Billets  
Virginia Bessemer Ore Co.

**H. L. GREGG & CO.,**  
Ship Brokers & Commission Merchants,  
Importers of  
**Old Iron, Metals and Rags.**

Freight engagements made to all parts of the world.  
Marine insurance effected in reliable offices.

108 Walnut St., Phila.

## THE CAMBRIA IRON WORKS,

Situated on the line of the Pennsylvania Railroad,  
at the western base of the Alleghany Mountains, are  
the largest of their class in the United States, and  
are now prepared to make

**1800 TONS PER WEEK,**  
**Of Iron and Steel Railway Bars.**

The Company possesses inexhaustible mines of  
Coal and Ore, of suitable varieties for the produc-  
tion of Iron and Steel Rails of

## BEST QUALITY.

Their location, coupled with every known im-  
provement in machinery and process of manufacture  
enable them to offer rails, when quality is con-  
sidered, at lowest market rates.

The long experience of the present Managers,  
of the Company, and the enviable reputation  
they have established for "CAMBRIA RAILS,"  
are deemed a sufficient guarantee that purchasers can,  
at all times depend upon receiving rails unsurpassed  
for strength and wear by any others of American or  
foreign make. Any of the usual patterns of rails  
can be supplied on short notice, and new patterns of  
desirable weight or design will be made to order.  
Address,

**CAMBRIA IRON COMPANY,**  
218 S. 4th St., PHILADELPHIA.  
or at the works, JOHNSTOWN, PA.

## Siemens' Regenerative GAS FURNACE.

**RICHMOND & POTTS,**  
119 S. Fourth St., PHILADELPHIA, PA.

## W. D. WOOD & CO.'S



## PATENT Planished Sheet Iron.

Patented March 14th, 1865; April 8th, 1873;  
Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876.

Guaranteed fully equal in all respects to the

**IMPORTED RUSSIA IRON,**  
and at a much less price.

**FOR SALE,**  
by all the principal

**METAL DEALERS**

In the Large cities throughout

**THE UNITED STATES.**

And at their Office,

111 Water Street PITTSBURGH, PA.

**Spooner & Collins,**

COMMISSION AGENTS,

**PIG IRON**

Blooms, Bar, Sheet & Hoop Iron.

409 N. Third St., (Room No. 6), St. Louis.

## THE PHOENIX IRON CO.,

410 Walnut Street, PHILADELPHIA.

Manufacturers of

**CURVED, STRAIGHT AND HIPED**  
**Wrought Iron Roof Trusses, Beams, Girders & Joists,**

and all kinds of Iron Framing used in the construction of Iron Roof Buildings.

**DECK BEAMS, CHANNEL, ANGLE AND T BARS**

curved to template, largely used in the construction of Iron Vessels.

**PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,**

For Top and Bottom Chords of Bridges.

**Railroad Iron, Street Rails, Rail Joints and Wrought Iron Chairs.**

**REFINED BAR, SHAFING, and every variety of SHAPE IRON made to Order.**

Plans and Specifications furnished. Address,

SAMUEL J. REEVES, President.

## V. G. HUNDLEY.

79 Reade Street, New York. Agent for



## North Carolina Handle Co.,

(WILSON &amp; SHOBER, Proprietors.)

Manufacturers of **SPIKES, AXES, PICKS, SLEDGE HAMMERS, HATCHETS** and other  
handles. Full assortment always on hand.

## Iron.

## J. & J. Rogers Iron Co.,

AUSABLE FORKS,

Essex Co., - - - N. Y.

Manufacturers of

## FINE CHARCOAL Blooms & Bars

For Conversion into Cast Steel.

ALSO,

## Horse Shoe, Round Square and FLAT IRON,

Exclusively from Palmer Ore.

Agents

Merritt Trimble, - - - 21 Platt St., N. Y.

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Wrought Iron Buildings, Wrought Iron Bridges, Cor-  
rugated Iron Roofs, Shutters, Doors, Flooring, &c.  
Corrugated Sheets of all sizes manufactured by Moseley  
Iron Bridge and Roof Co., No. 5 Day St., N. Y.

## Bonnell, Botsford & Co.,

## Iron, Nails & Spikes.

YOUNGSTOWN, OHIO.

## OLD DOMINION

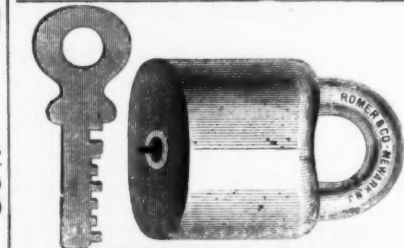
**Iron and Nail Works Co.,**  
**RICHMOND, VA.**

**R. E. BLANKENSHIP,** Commercial Agent,

Manufacture

## NAILS AND BAR IRON.

Brands, Merrells, Horse Shoe Bars, Nut and  
Rivet Iron, Spike Rods, Shuttling, Bridge  
Bolts, Ovals, Half Ovals, Half Rounds, &c.



**ROMER & CO.,**  
Established 1837. Manufacturers of Patent Scandinavian  
or Jail Locks. Brass Pad Locks for Railroads and  
Switches. Also, Patent Stationary R. R. Car Door  
Locks. Patent Piano and Sewing Machine Locks.  
141 to 145 Railroad Avenue, NEWARK, N. J.  
Illustrated Catalogue sent on application.

## COIL CHAIN.

We furnish

**A Better Chain for Less Money**

Than any manufacturer in the country.

Quotations made exclusively to wholesale dealers  
and jobbers.

## Union Chain & Cable Co.,

Pittsburgh, Pa.

H. MORTON, President.



## COVERT HARNESS SNAP

Horse and Cattle Ties, Chains for Hitching Posts, Rod  
Post Chains, Breast Chains, Hold-Backs, etc. sold by  
all principal jobbers in General and Saddle Hardware.  
Send for illustrated circular and price list. Address

HOLD BACK SNAP CO.,

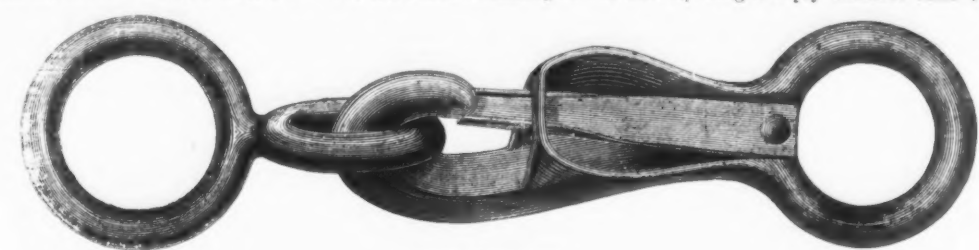
Sole Manufacturers, Troy, N. Y.

## Improvements in Miners' Lamps

Messrs. Lee Brothers, of Plymouth, Pa., have  
recently introduced an improvement in miners'  
lamps, which, although very simple, makes the  
lamp very much more durable. The ordinary  
lamp cover consists of three pieces, the upper  
one forming the top, an under one which is  
struck up so as to form a plug, the flange of  
which is folded under the edge of the top, and  
lastly another piece soldered on which forms  
the hinge. The flame from the spout of the  
lamp not unfrequently unsolders the hinges  
and, of course, the cover is lost. The improve-  
ment of Messrs. Lee Brothers consists in mak-  
ing the whole top of a single piece of metal.  
The top and bottom pieces when cut out are  
left connected by a strip of metal which forms  
the hinge. The bottom is thus struck up and  
its edge folded under the edge of the top piece.  
The whole cover of the lamp is thus made se-  
cure against unsoldering. As a piece of stamp-  
ing these covers are good examples of very  
neat work. The whole lamp is very neatly and  
carefully made, care being taken that all parts  
are oil tight.

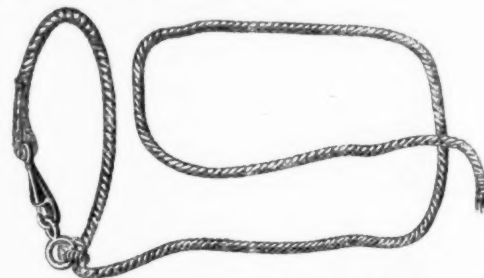
## New Cattle Tie.

The accompanying cuts illustrate Sargent &  
Co.'s new cattle tie, No. 5. This tie is made of



NEW CATTLE TIE.

Sargent's patent snap and a new double ring or  
eye. The smaller cut illustrates the manner of  
fastening the rope to the iron. It can be ad-  
justed to any size by simply slipping the rope  
through the ring and tying in an ordinary knot.  
It is made of malleable iron, neatly japanned,  
packed two dozen in a box. The price, with-



out rope, is \$1.50 per dozen, discount 60 per  
cent. and 10 per cent. for prompt cash.

## New Patents.

We take the following abstract of new  
patents, recently issued, from the official  
record:

**METALLIC PLATE COMPOUNDED OF IRON AND STEEL.**

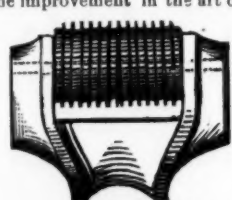
To Charles P. Haughian, Brooklyn, N. Y.—Oct. 10.—The combination of the internal body



of steel A and a protecting casing consisting of  
alternate layers B C D, of iron and steel.

**CUTTING AND FACING EMERY WHEELS.**

To T. A. Richards, Brooklyn, N. Y.—Oct. 17.—1. The improvement in the art of cutting



emery wheels, grindstones, granite, sandstone,  
marble, slate and other like material, natural  
and artificial, by screw thread cutters.

2. The improvement in the art of cutting  
emery wheels, grindstones, marble, slate and  
other like material, natural and artificial, by  
screw thread cutters made to cross-cut, as by  
right and left-hand screw thread cutters passing  
alternately over the same surface.

3. A roller cutter for facing stone, provided  
with screw thread cutting surface on its cir-  
cumference.

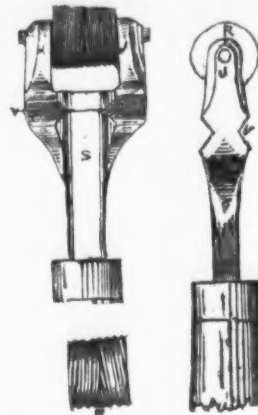
4. A roller cutter for facing stone, provided  
with a right-hand screw thread cutting sur-  
face, in combination with a roller cutter pro-  
vided with a left-hand screw thread cutting  
surface.

5. A cutter for operating upon the surface  
of stone or other like material, provided with  
rollers, the cutting devices of which are located  
diagonally to each other, and so fixed as to  
compel the path of the cuts of one diagonal  
to cross those of the other diagonal in the  
same course, and by repetition plane the sur-  
face traversed.

6. The improvement in the art of cutting  
stone and other like substances by roller cut-  
ters, the cutting devices of which are located  
diagonally to each other, and so as to cross-cut,  
one over the path of the other in the same  
course, and by repetition plane the entire sur-  
face traversed.

## TOOLS FOR FACING EMERY WHEELS.

To T. A. Richards, Brooklyn, N. Y.—Oct. 17.—The tool for facing emery wheels and grind-



stones shown, consisting of the handle H,  
provided with the jaws J J, and the cutters  
R R.

## TOOL HOLDER.

To Alfred J. New, R. A. Matthews and William  
Henry Berry, Nottingham, England.—Oct. 24.—

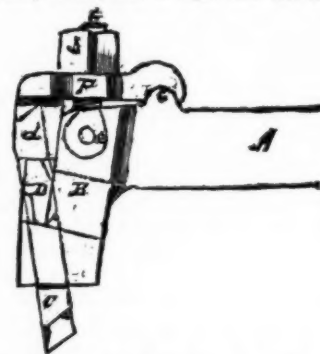
1. The tool holder consisting of the stock A,

the head B, mortised or slotted, as shown, the  
clamp F and the swivel bolt G, with nut b.

2. The combination of the head B, mor-  
tised or slotted, substantially as shown, the  
clamp F, constructed as specified, and the  
roughened wedge D and tool C, formed as de-  
scribed.

3. In a tool holder, the clamp F, pivoted  
or fulcrumed, as shown at c, and provided with  
a jaw d, in combination with the swivel bolt G  
and nut b.

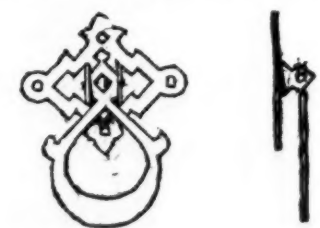
4. The combination of the head B, having  
a socket, or slot, with a right and left taper,



a tool C, with parallel sides, and a wedge D,  
having its opposite sides tapered precisely as  
the walls of the socket, all for the purpose  
of adjusting the tool either to the right or  
left.

## DRAWER PULL.

To W. N. Weeden, Waterbury, Conn.—Oct. 17.—The drawer pull, consisting of the skele-

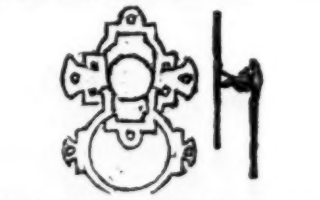


ton sheet metal base, with the ears or cut  
out portion turned up therefrom, combined  
with a swinging handle hinged to the said  
ears.

## DRAWER PULL.

To W. N. Weeden, Waterbury, Conn.—Oct. 17.—The drawer pull, consisting of a skeleton

sheet metal base, with one or more parts cut  
from the base, slotted and turned outward,



combined with a sheet metal handle, construct-  
ed with a shield, or boss, and tongue project-  
ing therefrom, the said tongue bent to form the  
hinge connection.

The following trade-mark was duly registered  
during the week ending Oct. 10:

4050.—Cutlery.—Theilo & Quack, Elberfeld,  
Germany.

"A representation of the device of two fish-

hooks and the letters and character 'T. & Q.  
E.'"

The following design was patented during the  
week ending Oct. 24:

9603.—Spoon and Fork Handle.—George Wil-  
kinson, Providence, R. I., assignor to Gor-  
ham Manufacturing Company, same place.  
Term of patent 7 years.

## English and American Railways.

—In an interview Mr. John Walter, M. P., proprietor  
of the London Times, spoke as follows of Amer-  
ican railway practice: He had traveled exten-  
sively since his arrival in this country, visiting  
Boston, Albany, Chicago, Cincinnati, Washing-  
ton, Philadelphia, and many others of the  
principal cities. He did not feel himself com-  
petent to judge of the comfort of ordinary  
American railway traveling. He had ridden so  
luxuriously in the special Pullman car which  
had been placed at his disposal that he was  
unable to form any idea of the way in which  
other people traveled. "The palace car," he  
exclaimed enthusiastically, "is fit for the Queen  
to ride in! In fact, it is much handsomer than  
the one she uses." The liberality with which  
railroad directors carried him to and fro over  
the land was a cause of great astonishment to  
Mr. Walter. It was a courtesy entirely un-  
known in England. The Queen herself was  
obliged to pay immense sums every year for

railway conveyance, and no railway company  
in all England would think of offering a coach  
for the free use of any gentleman, public or  
private. The American car, in Mr. Walter's  
estimation, was far superior to the English car-  
riage. The possibility of being shut in with  
thieves or madmen (it had fallen to his own lot  
to be shut in with a madman); the close,  
cramped quarters which in their very nature  
stifled all the comfort out of the unhappy  
traveler; the partitioning a man from the sight  
and society of his fellow creatures; and above  
all the shortness of the carriages, which caused  
them to sway and jerk about so violently that  
conversation became a torture and reading an  
impossibility. All these things combined to  
render a journey in an English railway carriage a  
matter of something worse than unpleasantness.  
The permanent way or roadbed of the English  
railroad was much more substantial than that  
of the American, but the English carriages  
could not be compared with the American  
cars.

## Ingenious Electrical Apparatus.

—In the apartment of the new and magnificent scien-  
tific structure erected in Oxford, England, al-  
located to experiments in electricity of high tension,  
an apparatus of remarkable ingenuity has been  
provided for keeping the air of the room dry.  
This apparatus consists of a heated copper  
roller, over which passes an endless band of  
flannel; the roller is heated by means of gas  
lights within it, which, being constantly burn-  
ing, cause every part of the flannel to become  
hot. The vapor which arises from the heated  
flannel is carried off by the current of air which  
supplies the burners inside the roller. The  
flannel, when thus dried and cooled, passes in-  
to the open air of the room where it again ab-  
sorbs moisture, and thus the air of the room be-  
comes so dry that the electrical instruments are  
preserved in a highly insulated condition, thus  
admirably meeting all the requirements of the  
case. Nor is this all. The electricity passes  
from the electrical machine to the table in the  
lecture room by insulated wires connected with  
the prime conductor of the machine. The  
highest room in the building occupies the up-  
per portion of the tower, its floor being more  
than 50 feet above the ground; and in this room  
is placed a Bunsen water pump, the water from  
which has thus a vertical fall of considerably  
more than fifty feet. This pump is used for  
exhausting a large receiver, from which pipes  
communicate with different rooms, so that  
when it is desired to exhaust the air from any  
vessel it is only necessary to connect it with one  
of these pipes, and turn on a vacuum. For a  
more perfect exhaustion the Spengel or other  
air-pump is necessary. On the top of the tower  
referred to is fixed a wooden mast, carrying a  
pointed metal rod, for the purpose of collecting  
atmospheric electricity.

Krupp, the well known ironmaster of Prussia,  
has lately patented a mode of manufacturing  
car wheels. A skelp is first formed of a long  
flat plate of iron, with a central rib above and  
corresponding groove beneath, and wide at  
each end. One end is secured to a rotating  
mandrel and is rolled on itself, forming the  
hub; the coiling being continued, the narrow  
portion of the skelp is wound on itself, form-  
ing the web; the coiling of the outer wider  
end forms the rim. The blank thus formed is  
placed in the furnace, heated to a welding heat,  
and welded under pressure into a homogeneous  
mass of the proper shape, forming the com-  
pleted wheel. We think the American method  
of casting wheels with chilled tread altogether  
better, simpler, cheaper and more satisfactory  
in its results.

Specimens of paper and cardboard made  
from peat were recently presented to the Ber-  
lin Polytechnic Association by Herr Vert-  
Meyer. The cardboard was so thick that it  
could be played and polished. Paper made of  
peat alone is like that made from wood or  
straw, but only 15 per cent. of rags is needed  
to give it consistence. A large factory for the  
manufacture of peat paper is to be established  
in Prussia.



## Iron.

CLEVELAND.

## Cleveland, Brown &amp; Co.

IMPORTERS, MANUFACTURERS AND DEALERS

## IRON AND STEEL,

HORSE SHOES, HORSE TAILS,

NORWAY NAIL RODS,

NAILS, SPIKES,

"Standard Taper" Axles &amp; Swedes Iron.

WINDOW GLASS,

Wrought Iron Pipe and Boiler Tubes.

Chains, Rivets, Nuts, Washers, and Heavy Hardware Generally.

25, 27, 29 &amp; 31 Merwin Street,

CLEVELAND, OHIO.

## The Iron-Masters' Laboratory.

Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Sags & Coal for Practical Metallurgical Purposes.

No. 339 Walnut Street, Philadelphia.  
J. BLODGET BRITTON.

This Laboratory was established in 1866, at the instance of a number of practical iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

## CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ore or alloy..... \$4.00  
For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12.50  
For each additional constituent of usual occurrence..... 1.50  
For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.  
For determining the per cent. of Sulphur and Phosphorus in Iron or Steel..... 14.00  
For each additional constituent of usual occurrence..... 5.00  
For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10.00  
For each additional constituent..... 2.00  
For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12.50  
For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.  
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.  
Printed instructions for obtaining proper average samples for analysis furnished upon application.

## GEORGE W. BRUCE.

No. 1 Platt Street, New York.

Offers a full assortment of Nettlefold's superior Screw Eyes, Hooks, &c., also many sizes of their Screws, which can be supplied very advantageously for foreign orders, though our duty equals the present American price.

## BORAX.

We beg to offer to the trade our own well known brand of strictly pure crystallized Borax, in barrels and cases, at greatly reduced prices. Apply for terms at

CHAS. FEIZER &amp; CO.,

Manufacturing Chemists, New York.

Established 1823.

JOHN P. MOORE'S SONS,  
Wholesale Gun Dealers

Everything in the line. Eley's Goods. Colt's Revolvers, etc., etc. Bottom prices guaranteed.  
300 Broadway, New York.

**AN INVENTION WORTH HAVING**  
WINDOW BLINDS OPENED INSIDE  
AND SECURELY FASTENED OPEN OR SHUT  
WITHOUT RAISING THE WINDOW BY USING  
THE HOLBROOK PAT. BLIND HINGE  
SEND FOR DESCRIPTIVE  
CIRCULAR ADDRESS  
THE HOLBROOK PAT. BLIND HINGE  
M.F.G. CO.  
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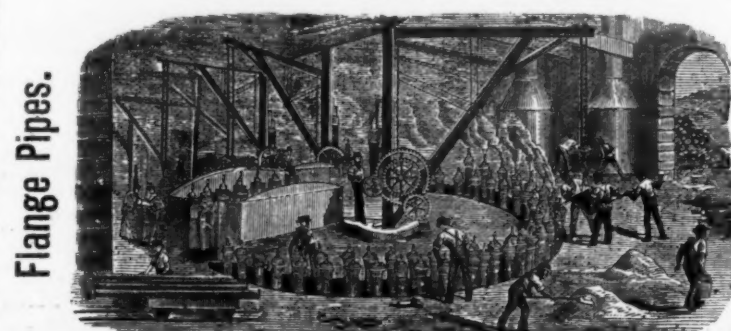
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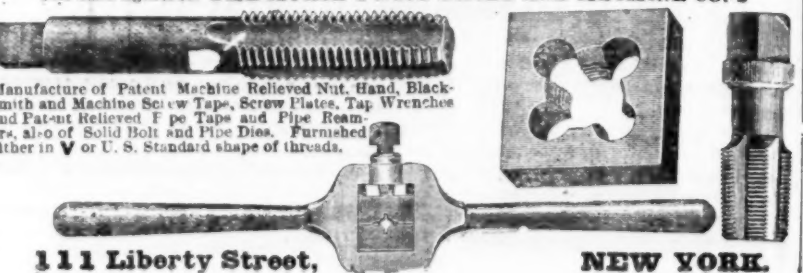
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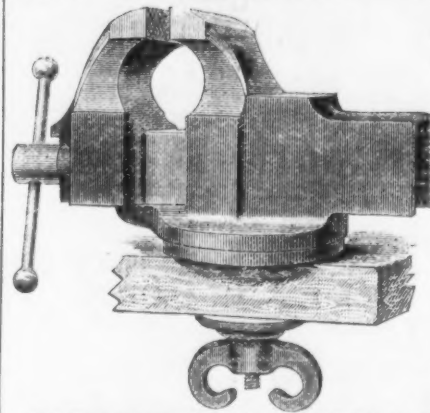


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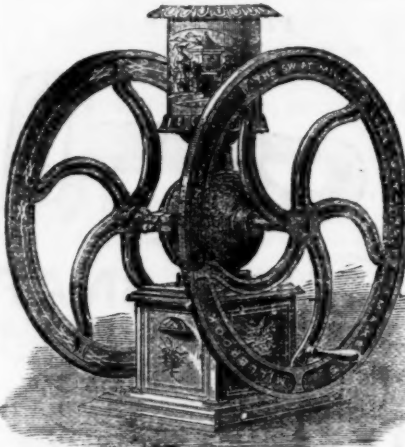
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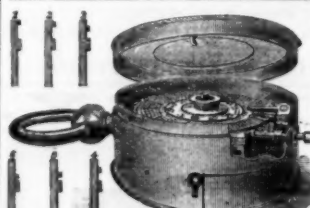
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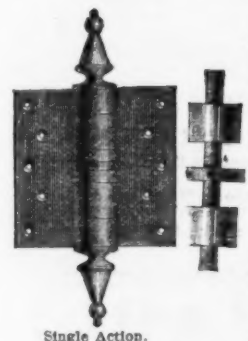
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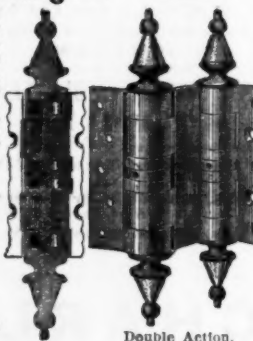
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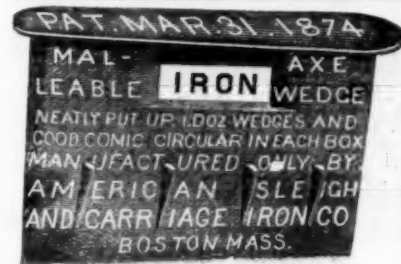
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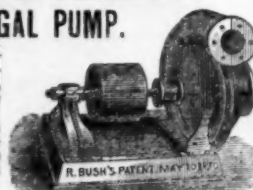
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**On the Open Spray Tuyere and Other  
Blast Furnace Tuyeres.\***

The practice of blast furnace engineers and managers, as to the dimensions and shape of the tuyeres they adopt, varies greatly in different districts; but until recently all the tuyeres in use, since the introduction of hot-blast first necessitated a water tuyere, may be classed under two heads, namely, the coiled tuyere and the water jacketed tuyere. Various tuyeres on both systems will be briefly noticed; but the principal object of this paper is to describe the open-spray tuyere, invented by the writer, for which important advantages over either of the systems previously in use are claimed.

The coiled tuyere is generally made of a coil of wrought iron tube imbedded in the sides of a hollow cone of cast iron. Sometimes the coils are wound close at the nose of the tuyere, in order more effectually to prevent the cast iron from burning; and sometimes the tuyere itself is formed entirely of a coil of tube, closely wound from end to end.

The water jacketed tuyere is generally made of wrought iron, and consists of two conical tubes of different diameter, connected at each end by rings of wrought iron welded in, so forming a space between the two concentric walls of the tuyere, which is filled with water supplied under pressure, and generally brought in through a feed pipe at or near the bottom of the tuyere, and allowed to escape through a second pipe in the upper side.

Tuyeres of this description were illustrated by figures showing the ordinary wrought iron tuyere, the gun metal tuyere, on the use of which a paper was read before the Institution of Mechanical Engineers in the year 1865 by Mr. Solly, who first introduced these tuyeres.

A water jacketed tuyere, of a kind which is very much used on the Continent, is made of wrought copper, the inner tube being brazed in, and a wrought iron ring either brazed or riveted in at the rear end.

The phosphor bronze tuyeres are generally fixed in a cast iron casing or box, beyond which they project into the furnace for the greater part of their length, and they are so arranged that they can be turned round in the cast iron plate or box in order to expose a different side of the tuyere to the action of the materials in the furnace. Greater durability is claimed for phosphor bronze than for gun metal or copper, but each metal possesses the same advantage of preventing adherence of slag, scoria or iron to the nozzle of the tuyere, which is the only object to be gained by the use of copper or its alloys in preference to iron. Additional precautions as to water supply have to be taken where such metal is used, as, owing to the low temperature at which it melts, a tuyere may be more rapidly destroyed than an iron tuyere where any overheating is possible; but under favorable conditions both gun metal, copper and phosphor bronze tuyeres have been found very durable, and the advantage gained by keeping the blast nozzle always clean and fully open is an important one.

A modification of the wrought iron water jacketed tuyere was introduced by Mr. Hodgette, in which the supply pipe was made to deliver its water round the nose of the tuyere through a series of perforations, and the return water was made to flow round the tuyere casing by a fillet placed in the inner tube. This tuyere, like the ordinary water jacketed tuyere, is close at the back and is kept full of water.

The open spray tuyere, invented by the writer of this paper, consists of two concentric conical tubes, closed at the nozzle but open at the rear end. The water supply is connected in the usual manner with a flexible hose, and various systems of spray pipes are used to suit various shapes of tuyeres and various conditions of water supply. Wrought iron tuyeres on this system, an open spray tuyere of malleable cast iron, a small gun metal open spray tuyere, and the open spray tuyere of standard dimensions, showing also a complete section of the tuyere, were also illustrated by drawings and specimens.

The form of spray pipe consists of three wrought iron tubes, slightly flattened toward the point, and in some cases shaped or bent to suit the shape of the tuyere. These three tubes are joined by a wrought iron filling piece, which is connected by a fourth tube with the water supply. The spray pipes are made either of wrought iron, brass, or copper, and a sufficient amount of water is allowed to escape through small holes or slits in the spray pipes to protect every part of the tuyere casing which is exposed to the heat of the furnace. The spray pipe may have the two side pipes bent back and plugged at the ends with wooden plugs, which may be removed occasionally if it is thought desirable to clear the spray pipe from any sediment. The spray or jet of water from each hole in the spray pipe spreads over a considerable surface, and a small number of holes is, if they are properly placed, sufficient to keep the whole interior surface of the tuyere casing constantly wet. Scarcely any steam is visible, and the waste water passes away, after cooling the tuyere, at a temperature little exceeding that at which it entered, unless a large portion of the tuyere is exposed to violent heat, in which case the temperature of the waste water is certainly no greater than it would be from a tuyere of the old system placed under the same conditions. The spray is principally directed to the nose end of the tuyere and beats back to some extent on the top and sides, which are also protected by a sufficient number of additional sprays from holes drilled in the spray pipes. The water falls round the sides and end of the tuyere and escapes from the back through the waste water pipe.

The same amount of water which is used in water jacketed or coiled tuyeres is found amply sufficient to protect spray tuyeres, and it is only

\* Read by F. H. Lloyd, before the Institution of Mechanical Engineers.

in exceptional cases that it is found desirable to use more water than would be required by other tuyeres.

It is possible to protect the tuyere by this system with less water than is required to protect a coiled or close water tuyere; but in most cases where these tuyeres have been adopted no change whatever has been made to the connections regulating the amount of water supply.

In cases where tuyeres on the old system are durable, these are found to be equally so under the same conditions; but where tuyeres on the old system have been giving considerable trouble and lasting only a few days, or at the most weeks, these tuyeres have, in many instances, proved far more durable than those previously used. In some cases where tuyeres required renewal almost every week, when coils were used, spray tuyeres have lasted many months.

The durability, however, of these tuyeres, though now sufficiently proved, is not their main advantage. Like all others, any derangement or choking of the water supply will cause them to burn out; and, in common with all other tuyeres, they are liable to some of the accidents which will be referred to. It is under such unfavorable circumstances that the advantages of these tuyeres are most apparent. If a small hole be made in the side or end of the tuyere, either from "drilling" or stoppage of water supply, or any other cause, it is still impossible for water to escape into the furnace. Frequently a tuyere that is heating may be saved by slaking or adjusting the spray pipe; but even if the end of the tuyere is entirely burnt it is still impossible for water to flow into the furnace, as the blast will at once escape through an aperture, be it small or large, and, consequently, blow back any spray through the open end of the tuyere casing. If the hole is small and the damage is detected in time, the adjustment of the spray pipe will often cause it to iron up. If too large for this, there is still no necessity for haste in removing the tuyere, as the escape of blast through the aperture drives back the spray and prevents the possibility of any harm or danger, such as would result from the fall of this water into the furnace.

When a spray tuyere is damaged it can generally be repaired after removal by welding a small piece of iron on the damaged part; or in the case of gun metal or copper tuyeres, a piece may be tapped or brazed in and the tuyere made as good as new at a very trifling expense.

The principal causes of injury to water tuyeres of all kinds may be enumerated as follows:

1. The stoppage of supply pipe through incrustation, or from the deposit of mud, shells, dirt, or vegetable matter accumulating in the tank or reservoir from which the water supply for the tuyeres is obtained.
2. "Drilling," caused by the constant dropping of metal or slag on an exposed part of the tuyere, which in the course of time forms a hole in the surface exposed to it. Where a defect arises from this cause it will be found in the upper side of the tuyere. "Drilling" is also caused by molten metal or slag attacking the nozzle and the lower surface of the tuyere; this may arise from the defective workings of a furnace where the contents of one side of the hearth have become partially solidified, and there is no regular fall or "sink" of materials. In this case the molten metal or slag being unable to get away, the action of a blast may cause it to beat back against the nose or lower surface of the tuyere until the continued action drills or burns a hole in it.

3. A third cause of destruction to tuyeres, which is more readily capable of explanation, arises when the materials in the furnace are so dense as to prevent the blast ascending freely, causing it to fight round the tuyeres, destroying the stopping, and leaving the greater part of the tuyere naked and exposed to heat, which under such circumstances is unusually intense round the tuyeres. A close tuyere, fed in the usual manner, when exposed to excessive heat will sometimes refuse its full supply of water, either from the generation of steam in the tuyere, or from some other cause, and this may cause the tuyere to burn, and thus allow the escape of water into the furnace.

4. Slips of material after a furnace has been hanging will sometimes destroy or blind every tuyere in a furnace, by the fall of solid material on them or in front of them. Accidents to tuyeres from this cause have not unfrequently caused severe explosions.

5. Another cause of injury to tuyeres, and of great danger where close tuyeres are used, arises from the slag, or in some cases the molten metal, rising up to the tuyere level. This may happen from neglect of the workman to open his furnace in time, or from having a hard tap so as to delay the running of the molten metal at casting time. In either case, or whether such a circumstance arises from any other cause, it is when damage to close water tuyeres has been occasioned by the rising of metal or slag to the tuyere level that the greater danger from the escape of any water into the furnace is to be feared.

The leakage from a very small hole in a coil or close water tuyere, from whatever cause it arises, will in most cases be evaporated by the heat of the furnace, and cause no further damage than a trifling loss of heat; but the same action that causes a small defect will very often increase the aperture before any leakage can be detected, and when leakage occurs from the lower side of a tuyere it is not unfrequently difficult to detect by examining the blast opening in the usual manner.

An instance of this has been brought under the notice of the writer, in which a coiled tuyere leaked, but owing to the position of the defect no indications of leakage were found on examination of the tuyeres, all the tuyere open-

ings showing a perfectly bright and clear fire. After a time the furnace manager became convinced from other indications that leakage was going on. He caused every tuyere to be removed, and the materials below a tuyere on one side of the furnace were found to be literally soaking with water, and had to be baked out to a considerable depth before fire could be found. What would have been the consequence if this mass of wet material had been forced into the molten iron below can only be guessed.

Several accidents of a very serious nature have occurred from the use of water jacketed tuyeres in the Staffordshire district within the last twelve months. In September last year an explosion occurred resulting in the death of four men, and in the following month the explosion of a water tuyere caused very severe injuries to fifteen men, of whom eight died either on the spot or within a short time afterward. In the latter case the severity of the explosion was occasioned by the iron having been allowed to rise to the tuyere level through the carelessness of the keeper in charge of the furnace. The tuyere which caused this explosion was produced at the inquest, and showed a small hole about half an inch in diameter on the outer edge of the nozzle. This circumstance makes it seem probable that a similar result would have occurred if a coiled tuyere had been in use instead of a water jacketed tuyere.

Beside these fatal accidents, two others causing considerable damage to property, though fortunately not resulting in loss of life, have since been reported, both of them arising also from the explosion of water jacketed tuyeres.

A simple and ingenious arrangement has been introduced for the purpose of detecting leakage when it occurs from any close tuyere. It consists of a water balance, which, so long as the same amount of water flows from the tuyere as is supplied to it, is kept in equilibrium; but the moment any leakage occurs the equilibrium is disturbed, and by this means a whistle or alarm is sounded. This arrangement is said to answer well, and to give warning when a very slight amount of leakage occurs. The warning, however, even if promptly acted upon, would not in all cases prevent danger, as in the case of the destruction of a tuyere from a sudden slip in the furnace.

The danger of accident from the causes alluded to is effectually prevented by the use of open spray tuyeres. Where incrustation is a cause of difficulty with other tuyeres, this system provides a complete remedy. The incrustation, as it forms, can be seen from the open end of the tuyere casing; and it is only necessary to stop the water supply for a few seconds, or for a sufficient time to dry and slightly heat the tuyere, causing the incrustation to crack and fall off as soon as the water is again turned on. If it is but slight, the incrustation will very soon be washed away; but if hard and thick, a repetition of the process once or twice will almost invariably remove it without damage to the tuyere. Stoppage of the spray pipes from incrustation, mud, or other impurities may occur, but it is not more liable to do so than in the water connections of other tuyeres, and in most cases the sediment escapes through the spray holes without any danger of choking them. With vegetable fiber or any large obstruction of course this cannot happen, and stoppage from these causes may result in the burning of a tuyere; but owing to the open end any such stoppage can be very readily seen, and may very often be remedied before any damage occurs.

If an open spray tuyere drills, the blast at once escaping through the aperture prevents any water entering the furnace, and thus avoids the dangers, inconvenience and loss of heat resulting from leakage where other tuyeres are used. Damage to the open spray tuyere arising from any other cause is equally free from danger, owing to the fact that no body of water is allowed to remain in the tuyere, and that the spray is at once blown back through the open end in the event of any aperture being made through which the blast can escape. Another advantage of considerable importance arises from its being unnecessary hastily to remove any tuyere or stop the water supply where this system is adopted, as a tuyere if damaged from any cause may be kept in use without danger and generally without inconvenience until an opportunity occurs for stopping the blast and replacing it.

Spray tuyeres have been made of wrought iron, ordinary cast iron, malleable cast iron, gun metal and phosphor bronze; also of wrought iron with a nozzle of other metal. Open spray tuyeres are now in use at about one-half of the furnaces in blast in South Staffordshire, and are being adopted also in other districts. The sizes already supplied vary in length from 10 inches to 3 feet, and in diameter from 2½ to 6½ inches at the nozzle. No difficulty is found in adapting the system to tuyeres of any size or shape. The tuyere, 3½ inches diameter at the nozzle and 30 inches long, is similar to a large number now in use, and is about the size generally used in the Staffordshire district. The 3 feet tuyere, 8 inches diameter at the nozzle, is that now adopted at the West Cumberland Iron Company's furnaces. The 6 inch tuyere is the size supplied to some furnaces in the Cleveland district. The 4 inch tuyere of malleable cast iron is of dimensions specified by a firm in Derbyshire.

The perfect safety of these tuyeres is admitted by every one who has tried them, and in most cases they have been found more durable than the tuyeres on the systems previously in use, whilst at the same time the saving in actual cost over a few months, as compared with other tuyeres, has not been inconsiderable.

The subject for the Cobden Prize Essay this year is "The Effect of Machinery on Wages." We imagine that the best essay on this subject would come from America, where we know a great deal more about the effect of labor-saving machinery upon the labor of a country than the people of Great Britain have yet had a chance to learn.



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Pawtucket, R. I.

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Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

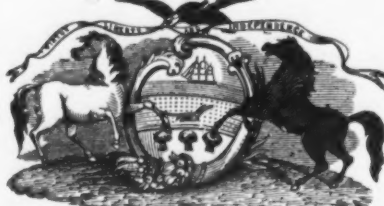
## THE BEST IS THE CHEAPEST.

McCaffrey's Standard American Hand Cut Files and Rasps are warranted to do more work than any other files and rasps in the market.

SILVER MEDAL

TRADE MARK.

HIGHEST PREMIUM.



## PENNSYLVANIA FILE WORKS.

McCAFFREY & BRO.,

No. 1732, 1734 & 1736 North Fourth St., Phila.

Messrs. ARNOLD & CO., 310 California St., San Francisco, Sole Agents for the Pacific Coast.

ESTABLISHED 1848.

C. T. DRAPER & CO.  
Sole Agents, N. Y.  
Manufacturers of SUPERIOR  
HAND CUT  
FILES and RASPS



FILES and RASPS  
Made from Best  
ENGLISH CAST STEEL.  
Quality guaranteed by written warranty  
when required.

## AUBURN FILE WORKS,

Superior Hand-Cut

## FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

FULLER BROS., Sole Agents,

89 Chambers and 71 Reade Streets, N. Y.

ELIAS G. HELLER.  
PETER J. HELLER.

GEO. E. HELLER.  
JOHN J. HELLER.



We invite the attention of  
the trade to our Celebrated  
American

Horse Rasps  
and Files,

made from the very best American Steel, all cut by hand,  
and warranted to give entire satisfaction. If requested,  
we will send sample lots, to be returned or held subject  
to our order, free of all charges, if not found as repre-  
sented. All Rasps not stamped as the annexed incor-  
porated trade mark are not genuine. Sold by Hardware  
dealers generally.

## FILES & RASPS,

Established 1868.

Best Cast Steel.

HAND-CUT. Manufactured by

JOHNSON & BRO.

No. 1 Commercial Street, Newark, N. J.

Established 1835. TRADE MARK ON

New Pattern

JOHN ROTHERY

MATTEAWAN

N. Y. Horse Rasps,

Hand-Cut Files and RASPS,

Made from English Cast Steel.

JOHN & WILLIAM ROTHERY,

Matteawan, N. Y.



Putnam's Government Standard

FORGED

Hammer Pointed

HORSE SHOE NAILS.

READY FOR DRIVING.

Manufactured from the best of NORWAY Iron,  
and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,

NEPONSET, MASS.

## Hiscox File Manufacturing Co.,

WEST CHELMSFORD, MASS.,

MANUFACTURERS OF EVERY DESCRIPTION

—OF—

FILES and

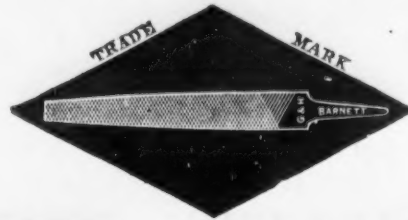
RASPS.

Alfred Field & Co.,  
93 Chambers & 75 Reade Sts.,  
NEW YORK CITY,  
GENERAL AGENTS.

All Goods Warranted.

## Black Diamond File Works.

Send for illus-  
trated Price List.



Send for illus-  
trated Price List.

G. & H. BARNETT. 39, 41 & 43 Richmond St. Phila.

LINFORTH, KELLOGG & CO.

Sole Agents for the Pacific Coast, 3 & 5 Front St., San Francisco, Cal.

St. Louis, Mo., SEMPLE, BIRGE & CO., Agents.

THOS. TAYLOR, 43 Chambers St., N. Y., Agent for N. Y. and N. E. States.

Established 1816.

## Peter A. Frasse & Co.,

95 Fulton Street, New York.

SOLE AGENTS FOR

## Thomas Turner & Co.'s Suffolk Works

SHEFFIELD.

## FILES AND HORSE RASPS,

And Importers of

## STUBS' FILES, TOOLS & STEEL,

W. J. Davies' Sons' London Emery Cloth,

HUBERT'S FRENCH EMERY PAPER.

## THOS. JOWITT & SONS, SHEFFIELD,

Manufacturers of every description of

## FILES.

Forged, Ground and Cut by  
Hand and Tempered by an  
Improved Process.

Manufacturers of

CAST, SHEAR & BLISTER

STEEL

For various purposes.

Granted according to Act of Parliament, and Registered in Germany and the United States.



ROLLERS, TILTERS &  
FORGERS.

Importers of

SWEDISH and RUSSIAN

IRONS.

Messrs. Russell & Erwin Mfg. Co.,  
New York and Philadelphia.

Messrs. Quackenbush, Townsend & Co.  
New York.

AGENTS:

Messrs. Huntington, Hopkins & Co.,  
San Francisco and Sacramento.

Messrs. Frothingham & Workman,  
Montreal.

## CHARLES B. PAUL,

Manufacturer of

## FILES.

Warranted

CAST STEEL.

157 Tenth Street, Williamsburgh, New York.

All descriptions of Files made to order. Price List mailed on application.

Established 1863

**HUSSEY, BINNS & CO.**  
MANUFACTURERS OF

**PLAIN BACK SOLID CAST STEEL SHOVELS**

(PAT. MAY 19, 1874 AND MARCH 30, 1875.)

OFFICE & WORKS: **PITTSBURGH**  
27 1/2 & RAILROAD STS. PA.

**OLD COLONY IRON CO.,**  
Taunton, Mass.,  
MANUFACTURE

Nails, Shovels, Spades, Scoops, &c.

SOLID CAST STEEL GOODS MADE TO ORDER.

Warehouse, 211 Pearl St., N. Y.  
P. O. Box 1267. **A. L. REID, Agent.**

G. T. RICHARDSON. F. H. SCUDDER.

**MIDDLEBORO' SHOVEL CO.**

MANUFACTURERS OF

SOLID CAST STEEL (ANTRIM) CAST STEEL  
AND IRON SHOVELS, SCOOPS AND SPADES.

OFFICE AND SALESROOM, 63 OLIVER ST. BOSTON.  
WORKS, MIDDLEBORO' MASS.

J. CLARK WILSON & CO. AGTS. 81 BEEKMAN ST. N. Y.



**Hoisting Machinery**  
Manufactured by  
Crane Bros. Mfg. Co.,  
CHICAGO.  
COOKE & BEGGS, Agents, 16 Cortlandt  
Street, New York.

Our New Illustrated  
Catalogue and Price List of  
**SCALES**  
AND  
**SPRING BALANCES,**  
is now Ready and will be sent to the  
trade, on application to  
**John Chatillon & Sons,**  
91 & 93 CHURCH ST.,  
NEW YORK.

**PRIZE MEDALLISTS:**  
London, 1862; Oporto, 1865; Dublin, 1865; Paris,  
1867; Moscow, 1872; Vienna, 1873, and Highest  
Award and Medal at Centennial Exhibi-  
tion, Philadelphia, 1876.

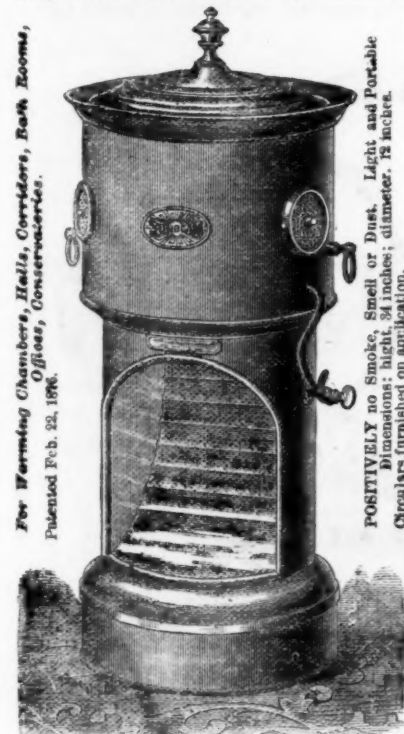
**CLARK & CO.,**  
Original Inventors and Patentees  
OF  
Noiseless Self-Coiling Revolving  
**STEEL SHUTTERS,**  
FIRE AND BURGLAR PROOF.

Also Improved  
**Rolling Wood Shutters**

Of various kinds. Clark's Shutters are the Best  
and Cheapest in the world. Are fitted to new  
Yulons Building, Leona Library, Delaware and Hud-  
son Canal Co.'s Building, Transatlantic Steamship  
Co.'s new Dock, American News Office, &c., Posey  
County Court House, Mt. Vernon, Holt County  
Court, Oregon, Mo. Also to buildings in Boston,  
Cincinnati, Detroit, Jacksonville, Fla., Baltimore,  
Canada, &c. Have been for years in daily use in  
every principal city throughout Europe, and are in-  
dorsed by the Leading Architects of the  
World.

Office and Manufactory,  
162 & 164 West 27th Street, N. Y.

**THE "SUNBEAM" ILLUMINATING  
GAS STOVE.**  
Prepares for Chilly Mornings and Evenings.



Reflected Light and Heat. Radiated Heat and Heated  
Air. Combustion of gas perfect.  
A. W. MORTON, Patentee, 22 Platt St., N. Y.  
Send for Price List. Territory for sale.

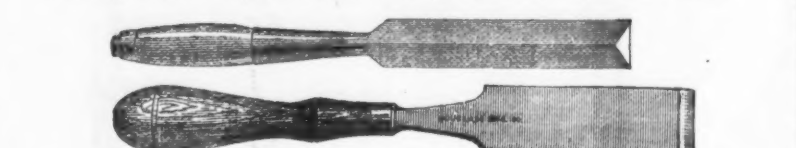


ESTABLISHED 1858.  
**PRINCE'S METALLIC PAINT,**  
AN INDESTRUCTIBLE COATING FOR  
IRON, TIN, OR WOOD,  
For Sale by the Trade and  
**PRINCE'S METALLIC PAINT CO.,**  
Manufacturers,  
225 Pearl Street, New York.  
Caution.—As certain parties are offering for sale  
a SPURIOUS PAINT, under an imitation name,  
purchasers will please see that our TRADE MARK  
is on every package. None other genuine.

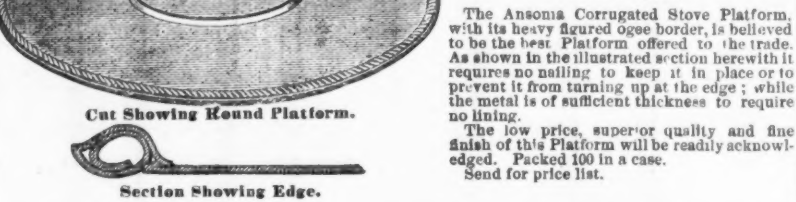
**THE DOUGLASS MFG. CO.,**  
New York Warehouse, 62 Reade Street. P. O. Box 2610.  
FACTORIES, Seymour, Conn.



Chisels, Gouges and Drawing Knives of all kinds, Screw Drivers,  
Screw Driver Bits, Cook's and Douglass Mfg. Co.'s Augers &  
Bits, Wood and Metal Head Gimlets, Improved Hollow  
Augers, Blake's Patent Extension Bits,  
Boring Machines, Chisel Handles, Wood Boxes, Tool Chests.

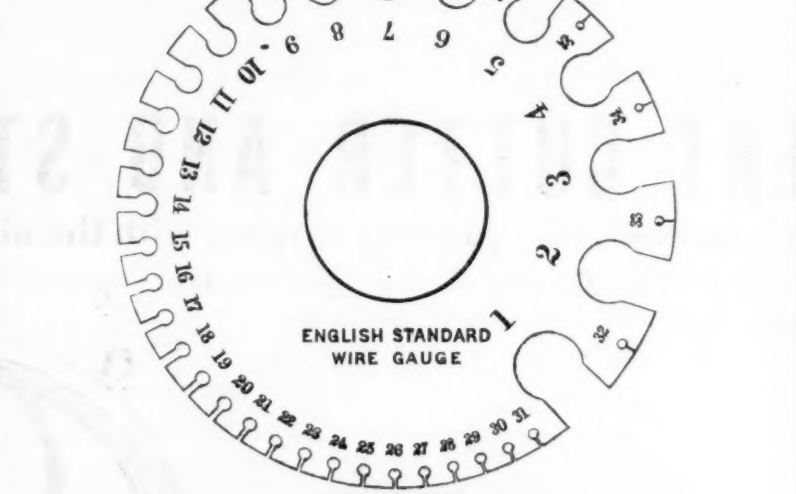


**ANSONIA CORRUGATED STOVE PLATFORM**  
Manufactured by the  
**Ansonia Brass & Copper Co.**  
Office, 19 & 21 Cliff Street,  
NEW YORK.



The Ansonia Corrugated Stove Platform,  
with its heavy figured edge border, is believed  
to be the best Platform offered to the trade.  
As shown in the illustrated action herewith it  
requires no nailing to keep it in place or to  
prevent it from turning up at the edge; while  
the metal is of sufficient thickness to require  
no lining.  
The low price, superior quality and fine  
finish of this Platform will be readily acknowl-  
edged. Packed 100 in a case.  
Send for price list.

**English Standard Wire Gauges**



MADE BY  
**DARLING, BROWN & SHARPE, Providence, R. I.**

**THE IMPROVED  
HOWE SCALES**

In Competition with the World, at Philadelphia, 1876.  
**TWO FIRST MEDALS, and TWO DIPLOMAS OF MERIT**

The following are the points that the Judges officially announce as the basis of their award of the  
highest honors to the Howe Scales:  
1st. For their Protected Bearings (the Howe is the only Scale with protected bearings), which makes the  
Scale **DURABLY ACCURATE.**  
2d. For their Strength.  
3d. For their Simplicity.  
4th. For their economy in construction.  
5th. For their first-rate material and workmanship.  
6th. For their various original improvements and adaptations (which being patented are exclusively  
possessed by the **HOWE**).

**The Improved Howe Scales**  
MADE BY THE  
**BRANDON MFG. COMPANY, of Brandon, Vt.,**  
Are Guaranteed Superior to all others.

For Plans, Prices and other information, address,  
**A. M. GILBERT & CO.,** 95 to 101 Lake St., Chicago. 116 Main St., Cin-  
cinnati. 11 S. Main St., St. Louis.  
**PAGE & CO.,** 3 Park Place, New York City. 63 Wood St., Pittsburgh.  
**I. S. WILLIAMS,** 213 Market St., Philadelphia.  
**PRIEST, PAGE & CO.,** 145 Franklin St., Boston.  
**V. S. W. PARKHURST,** Cor. Market & Fremont Sts., San Francisco, Cal.  
**FROTHINGHAM & WORKMAN,** Montreal, Canada.

**The Telegraph for Local Purposes.**

The growth of the local telegraph in our  
large cities within the last ten years has been  
very rapid, and within the last four years sys-  
tems of local communication by telegraph have  
increased with great rapidity.

One of the most extensive and universal in  
its applications of these systems is that em-  
ployed by the American District Telegraph  
Company. This company was organized in this  
city in June, 1872, with a triple purpose—to  
furnish protection against burglars, to give  
warnings of fire, and at a small expense to  
bring messengers for any occasion, within  
ready call. The company opened business in  
1872, at its single office in Broadway, with 55  
instruments in circuit and three messengers.  
In May, 1873, it had 1206 working instruments  
and 205 messengers, and to-day it employs more  
than 4000 instruments and about 500 boys.  
During the year ending October, 1876, 1,150,000  
messages were delivered, and the present daily  
average is about 4000. The method of opera-  
tion in New York is as follows: In the most  
suitable localities district stations are estab-  
lished—25 in all—each one of which "covers"  
about one-half a square mile of city blocks.  
In the house of each subscriber, who pays  
\$2.50 a month, an electric signal is placed  
which communicates with the nearest station.  
In case of fire, the touching of a spring com-  
municates at once through the telegraph station  
to the nearest engine house the exact location  
of the alarm. The sounding of the burglar  
signal brings to the spot within three minutes  
one of the special deputy sheriffs of the com-  
pany, and in case of necessity as many more as  
may be needed can be summoned. Where 50  
subscribers are obtained in a single block, a  
special patrolman is stationed there, who is re-  
quired every 15 minutes during the night to  
telegraph to the station, by means of signals at  
alternate corners, whether all is well. But the  
most important part of the company's work is  
the facility it affords for communication by  
messengers. The proper signal from any sub-  
scriber brings almost immediately to him the  
boy who, at the uniform price of 30 cents an  
hour, is ready to perform any honorable office  
that may be required of him. By an arrange-  
ment with the Western Union Company, mes-  
sengers take dispatches from subscribers' houses  
without extra charge. The most of the trans-  
fers of stocks in Wall street are made  
through the hands of these young fellows.  
They are selected with the greatest care, and  
are constantly subjected to the closest scrutiny.  
The cheap cab system, soon to go into opera-  
tion, is to act in connection with the American  
District Telegraph. The unhired cabs will be  
stationed near the offices of the company, so  
that by means of the signal they can be sum-  
moned as quickly as a messenger. This com-  
pany is continually extending its work through-  
out New York, Brooklyn, and the other large  
cities of the Union.

The Automatic Signal Telegraph Company  
has not so wide a scope to its work, but it aims  
to furnish more absolute and trustworthy pro-  
tection against burglary and fire. The raising  
of a window at night or the breaking open of a  
vault is made known at once by telegraphic  
signal at the Central office, and police aid is im-  
mediately sent to the spot. But the specialty  
of this company is its method of furnishing  
warning of fire. At distances of 20 feet apart  
throughout the buildings of its subscribers are  
placed little thermostats or heat detectors. One  
of these instruments consists of a metallic cylin-  
der, about three inches in length, in which is  
coiled a spring band or strip of two metals of  
unequal expansive power, connected with the  
metallic circuit. A screw connected with the  
open air circuit is inserted in the side of the  
cylinder. The strip and screw are insulated and  
the ends brought so close together that the ex-  
pansion of the metallic strip by a certain ad-  
ditional amount of heat will bring it in contact  
with the screw and close the circuit. At once  
the alarm signal, announcing the house and  
room, is given at the patrol stations of the New  
York Board of Underwriters, at the head-  
quarters of the New York Fire Department,  
and at the company's office. The instruments  
may be so regulated by means of the screw that  
the alarm will be given with any desired degree  
of heat. They are ordinarily set for 120 or 130  
degrees, but may be made so sensitive that the  
heat of the breath is sufficient to close the cir-  
cuit. They are now placed in about 200 build-  
ings of this city, including many large mer-  
cantile houses. A reduction of five cents for  
each \$100 is made by insurance companies in  
the risks they take in buildings provided with  
this apparatus.

Of the various telegraphic printing instru-  
ments now used extensively throughout the  
business part of the city for various purposes  
there are many kinds. Two are used for stock  
reporting. The Gold and Stock Company have  
in use between 500 and 600 instruments of Cal-  
ahan's invention, in which the letters and fig-  
ures are printed in different lines. The Man-  
hattan Quotation Company employ about 200  
instruments that print in a single line. There  
are, beside, the instruments used by the Pro-  
duce Quotation Company, invented by Edeson,  
and two of G. M. Phelps's patent for financial  
and general news.

The methods of telegraphic communication  
mentioned above are more or less public in  
character. In addition to these there are in  
New York a large number of private lines, con-  
necting the different houses of the same firm,  
offices and residences of individuals, or the  
business places of firms engaged in the same  
pursuits. The Gold and Stock Company have  
introduced a system that is used quite gener-  
ally. It constructs the line as may be desired,  
leaves the proper instruments, and keeps every-  
thing in running order at prices varying from  
\$300 to \$1000 a year. For this purpose there  
are four kinds of instruments—Edeson's, Gray's  
and two of Phelps's patents, of which the latter

are most used. There are about 2000 private  
lines in the city under the supervision of the  
Gold and Stock Company, and the number is  
fast increasing. Many business houses find it  
an almost indispensable part of their working  
apparatus. The superintendent of Lord &  
Taylor's establishments states that it would  
keep at least 20 messengers constantly busy to  
do the work that is done by their instruments,  
not to speak of the loss of time. The Law  
Telegraph Company serves as a means of  
private communication between lawyers who  
choose to subscribe. It began its work 18  
months ago with 50 subscribers. It now has  
115, and includes in the number nearly all the  
prominent law firms in the city. On the pay-  
ment of \$250 a year, the company put up the  
wires and furnish the instruments, placing  
the subscriber in communication with all others  
on the list. Each office is numbered. When  
one subscriber wishes to speak with another,  
he signals both his own and the other's num-  
ber to the central office, and the two are then  
put in direct communication. The lines con-  
nect also with the United States courts and  
the county courts of both New York and  
Brooklyn, and with the Western Union Tele-  
graph Company. There are also many inde-  
pendent lines that, using Morse's sounding in-  
struments, run from one portion of the city to  
another, or to manufacturing out of town. The  
great obstacle in the way of the extended use  
of these is that the instruments require prac-  
tical operators, and are therefore expensive.  
The longest private line in this country, prob-  
ably in the world, is one belonging to Harrison  
Brothers & Co., of No. 115 Fulton street. It  
connects their house in New York with their  
Philadelphia house, and runs thence to their  
paint factories some miles outside the latter  
city. They state that, used for their own pur-  
poses alone, it is a great saving to them, and  
beside they lease it to other persons to a suf-  
ficient extent to reduce the expense to almost  
nothing.

**Dr. Anderson on Some American Tools.**

The well known Dr. Anderson, one of the  
British Judges and Chairman of the Board of  
Judges at the Exhibition on Machinery and  
Tools, has contributed a series of interesting  
articles for the London Times upon the machi-  
nery display at Philadelphia. In the course of  
one of these articles he pays a tribute to the  
superiority of American machine tools. He  
says the section which most conspicuously  
brings out the enormous strength of America  
as a producing power is that of tools, especial-  
ly the machine tools for metal, the parents of  
all other machines. These tools he describes  
as being designed for all purposes, and adds  
that almost all are finished in a style superior  
to that of any former exhibition. The new de-  
parture taken in punching metal by the ma-  
chine exhibited by Hoopes & Townsend, of  
Philadelphia, he says "has created a sensation  
among engineers of all countries, the United  
States included. The nuts punched by the ma-  
chine have two peculiarities—they are of inor-  
dinate depth and are punched cold. Nuts 1 1/2  
inches in depth have a 3/4 inch punch passed  
through them." The doctor speaks of the ad-  
miration caused by this achievement, and of  
the skill shown when the secret of how it is  
done leaked out. He says the fluid property of  
cold iron or steel is taken advantage of by in-  
troducing the element of time into the perfor-  
mance of the operation. The punch is given only  
the pressure it can sustain, and then nature be-  
ing allowed its way, the instrument penetrates  
at a rate proportionate to the flowing of the  
mass. Whilst the experimentalist and the phi-  
losopher have been writhing of the flow of  
solids, the natural law is here made use of  
practically. "Unimportant as it may seem,"  
yet vast issues are bound up therein," writes  
Dr. Anderson. "The seed sown in thousands  
of minds will bring forth many other applica-  
tions in metal working that are now deemed  
impossible."

**Wooden Steam Boilers.**—In a "History  
of the Steam Engine in America," lately pub-  
lished under direction of the Franklin Insti-  
tute, we find an account of the wooden steam  
boilers used in 1800 for the first engines of the  
Schuylkill Water Works. We quote as fol-  
lows: The boilers were rectangular chests,  
made of white pine planks 8 inches thick; they  
were 9 feet square inside at the ends, and 14  
feet long in the clear; braced upon the sides,  
top and bottom with oak scantlings 10 inches  
square, the whole securely bolted together by  
1 1/2 inch rods passing through the planks. In-  
side of this chest was placed an iron fire-box 12  
feet 6 inches long, 6 feet wide and 1 foot 10  
inches deep, with vertical flues, 6 of 15 inches  
diameter and 2 of 12 inches diameter; through  
these the water circulated, the fire acting  
around them and passing up into an oval flue  
situated just above the fire box, carried from  
the back of the boiler to near the front, and  
returned again to the back, where it entered  
the chimney. This fire box and flues appear to  
have been at first made entirely of cast iron;  
then a wrought iron fire-box was made, the  
flues still being of cast iron; this not being  
satisfactory on account of the unequal contrac-  
tion and expansion of the two metals causing  
leakage, eventually wrought iron flues were also  
put in. Great advantage was at the time sup-  
posed to be gained by the non-conducting  
powers of the wood, and also by the vertical  
flues in the fire-box. These boilers were used  
for about two years, but, as might have been  
expected, it was found very difficult to keep  
them perfectly steam tight. Cast iron boilers  
were accordingly substituted for them in De-  
cember, 1801, and these remained in use until  
new water works were built at Fairmount in  
1815, and cast iron boilers were used there  
until 1822, when steam-power was given up for  
water-power.



# RUSSELL & ERWIN MANUFACTURING COMPANY,

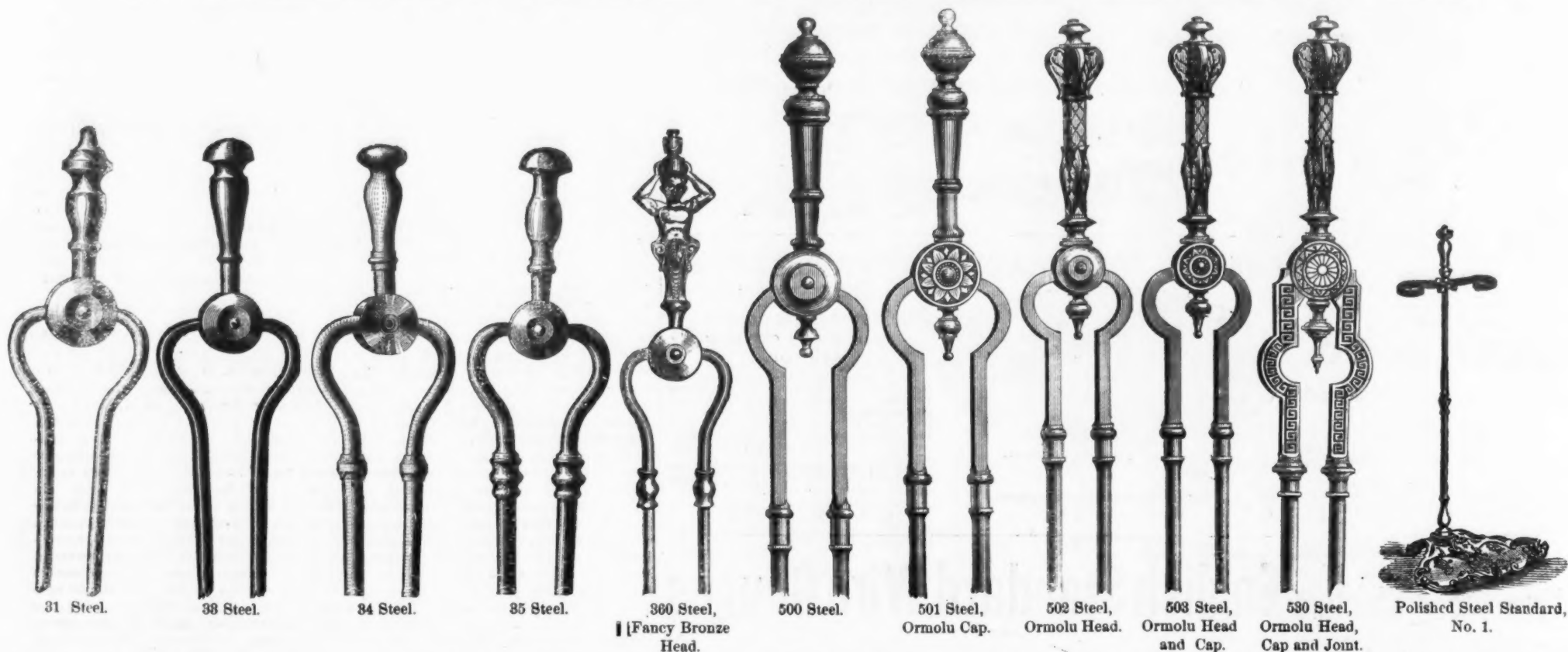
## Manufacturers of HARDWARE.

FACTORIES, - - - - NEW BRITAIN, CONNECTICUT, U. S. A.

MANUFACTURERS' AGENTS AND JOBBERS OF GENERAL HARDWARE AT OUR

WAREHOUSES: NEW YORK, 45 & 47 Chambers St.; PHILADELPHIA, 425 Market St.; SOUTHERN DEPARTMENT, BALTIMORE, MD., WM. H. COLE, Agent, 17 S. Charles St.

## POLISHED FIRE IRONS.

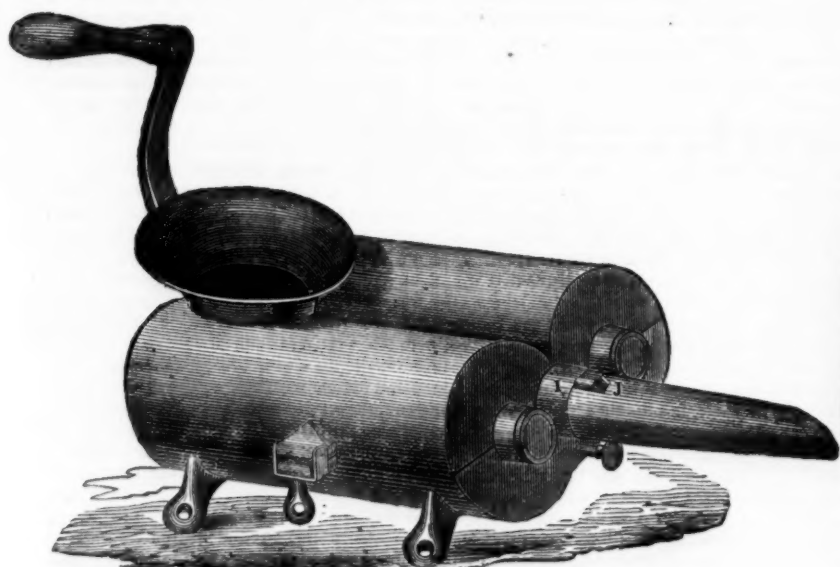


Send for Special Catalogue and Price List of these goods. Also see Trade Report of *The Iron Age* of Nov. 9th, for description of additional styles, cuts of which will shortly appear.

## HALE'S PATENT MEAT CUTTER AND STUFFER.

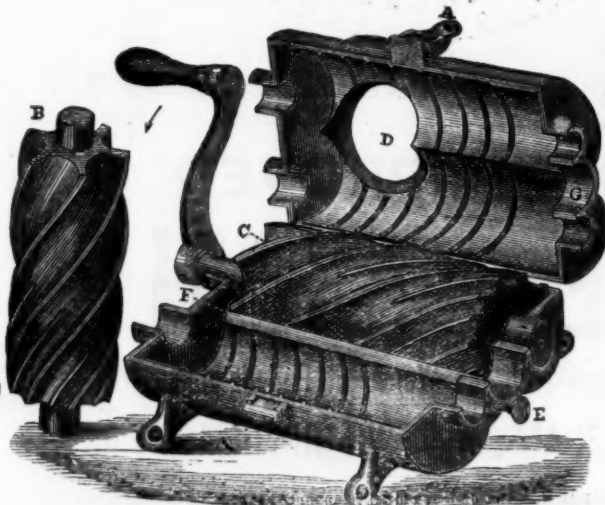
Will cut from 3 to 5 pounds per minute, the quantity varying with the size.

We can, without hesitation, offer this Cutter as the best article in use for the purpose. It will cut (not Tear) the meat more rapidly, is more simple in construction, having but one knife, which is self-sharpening, and is easier cleaned than any other Cutter made.



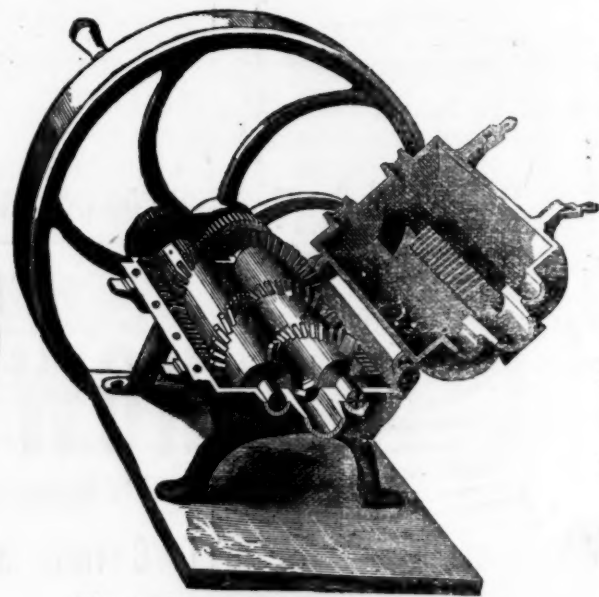
**HALE'S MEAT CUTTER,**  
Nos. 11, 12 and 13 (Closed.)

Nos.	11.	12.	13.
Length of Cylinders.	5 inch.	6 inch.	7 1/2 inch.
Per dozen.	\$27 00.	\$33 00.	\$42 00.



**HALE'S MEAT CUTTER,**  
(Open), showing position of Knife.

Nos.	11.	12.	13.
Length of Cylinders.	5 inch.	6 inch.	7 1/2 inch.
Per dozen.	\$27 00.	\$33 00.	\$42 00.



**Butchers' Meat Cutter.**

This Cutter is especially for Butchers' use. It is made with great care, *Extra Heavy and Strong*; has double Cylinders, each 10 lb. in length, with 54 Steel Knives; and is easily driven, by means of a heavy double geared balance wheel, either by hand or power. Having been thoroughly tested, it will cut (not tear) 500 pounds of meat an hour by hand alone.  
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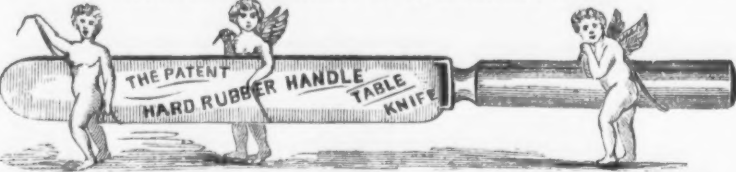
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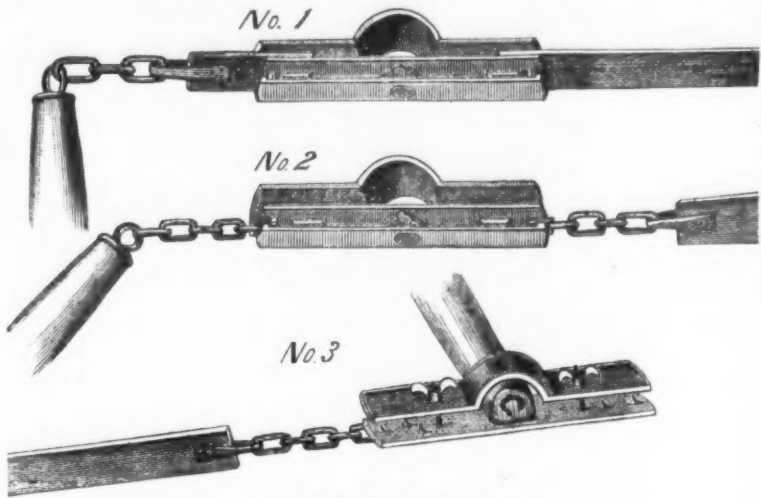
**Dahm's Patent Harness Coupling.**

We show in the accompanying illustration an article of novelty in the hardware line which will command itself to the favor of all who have experienced the difficulties of repairing broken harness without proper facilities. It is adapted to almost all varieties of conditions, and can be employed to temporarily repair any kind of accident likely to happen to harness on the road. It is a small implement, made of malleable iron, of good shape, neatly finished, and as light as is convenient with strength. Our illustrations show it in three applications—to the mending of a broken trace strap, a broken chain and a broken whiffletree. The adjustment is effected easily and quickly by turning the thumb-screws, and a break repaired becomes at once the point of greatest strength, and no delay need result from any accident likely to occur to harness on the road.

The utility of this simple, convenient and cheap device is greatest in situations where harness is subject to severe and unequal strains. They would be valuable as a part of the regular equipment of every teamster, car or stage driver and carman, especially during the winter season of "heavy wheeling." They are certainly a vast improvement upon the S hook which teamsters find it necessary

the company made its matches so cheap and poor that four or five were wasted for every one that produced a light. The *Regiesmonetter* became a standing joke in Paris, but to the poor it was no joke. The people began to complain and to find other means for striking a light.

The first year the match company paid its 16,000,000 of francs to the state and distributed a dividend of 10 per cent., gained, be it noted, by speculations upon the Bourse with the hundred and odd millions of caution money. The second year it was found that, instead of selling 60 milliards of matches, or 40, or 30 milliards, it was impossible to count upon the sale of more than from 20 to 22 milliards. Then came clamors and recriminations, with charges of fraud and contraband manufacture. The monopoly then obtained six laws from the Assembly to protect its rights, and a large force of inspectors and detectives was organized to stop the smuggling and the contraband manufacture, and they were given the police power of entering houses, of entering complain against individuals, of seizing at once all matches which did not bear the monopoly stamp. This finally became vexatious. Several persons resisted these agents, denying their pretended rights, and constant quarrels were the result. And, meantime, the matches became so poor and so dear that no one would use them



DAHM'S HARNESS COUPLING.

to carry, and upon which so little dependence can be placed in emergency. Further information can be obtained from the inventor and manufacturer, Mr. F. H. Dahm, 183 William street, N. Y.

**A Match Monopoly.**

A correspondent writing from Paris under date of Nov. 8th, tells the following curious and interesting story:

We have here one of the most singular financial scandals that has been seen in the present century. It shows what the country has to pay for a bad tax, based upon false fiscal theories and calculations. In 1871, when M. Thiers was so ambitious to pay the Germans out of France at once, and to get money by any means, M. Pouyer-Quertier imagined a tax upon lucifer matches. It was estimated that the country consumed 18,000,000,000 of matches each year. With large ideas upon this subject the Finance Committee estimated the annual consumption at 120,000,000,000. The difference between 18,000,000,000 and 120,000,000,000 is so great that one feels astonished at it, and disposed to ask upon what basis the two estimates can rest. But in order to be prudent, it was modestly declared, the commission counted upon one-half of this only, or upon 60,000,000,000. A tax of three centimes was then put upon each box of 100 matches, and five centimes, or one cent, upon each box containing 125 matches. As soon as this report was read, before any law upon the subject was passed, the dealers raised the price of their matches from two to three sous per box of 100. M. Pouyer-Quertier thought that the state ought to share with the grocers in this sum drawn from the public, and hence raised the tax to four centimes, and announced that this produced 15,000,000 francs per annum to the state. But the first few months produced only 400,000 francs, one after the other, leaving a deficit of 10,000,000 of francs in the estimates of the finance minister. Evidently something had to be done to save the situation, and at that moment M. Roche and Caussemille, the manufacturers of the famous wax tapers, offered to pay the state 16,000,000 francs a year if they were allowed a complete monopoly of the match trade in France. The offer was tempting, but guarantees were asked. It seems that some bold speculators had mounted a company with a capital of 40,000,000 francs, and had managed to persuade some of our largest bankers—Pillet, Will, Vernes, Hattiguer and others—that the company was sure of making millions. The money was raised—the state accepted the offer—the new match company got out its stock, and had its bonds quoted upon the Bourse at 150 francs premium. All the small match factories were bought out by the state at a valuation, the new company paying some 200,000,000 francs to secure its monopoly. When this was done, and the monopoly created by law, the price of matches was fixed. In a kilogramme—two pounds—there are 3500 wood matches, the two pounds being sold for 2 francs. It cost the company 1 franc 96 centimes to manufacture them, and counting interest and the 15 per cent. to be taken off for the trade, the company loses 24 centimes, or nearly 5 sous, on every box containing 2 pounds of wood matches. This difference was made up by abstracting a number of matches, selling 2700 for two pounds, instead of 3500, the public thus losing 800 matches in each large box by the monopoly. But this was not enough, and

when it could be helped. Smokers had their *briquets*, by which a fire could be easily obtained without having one's hand burned by a bit of sulphur flying from the end of a match, while the country people went back to flint and steel with a wisp of tow steeped in a solution of sulphur. In a year's time matches went out of fashion, and the great match company suspended payment.

The *American Exchange and Review* says: While numerous fires destroy about 80 cents in the \$100 annually of the whole combustible property of the United States, and something like one-third of this ratio in Europe, it is yet a curious fact that there are cities and towns almost absolutely fire-proof; that is to say, inflammability, internal hazard and external exposure are reduced to the minimum. Two examples of such flame exemptions exist in Buenos Ayres and Montevideo, two South American capitals, about 100 miles distant from each other, the former of which is still destitute of anything like a sufficient water supply, while the latter was similarly deficient until a few years ago. South American earthquakes make one story houses the fashion in South America, and one story houses are poor flame spreaders; and in addition to this, the country around the two cities named is poorly supplied with timber. So the houses have been built with a view to the greatest possible economy of wood, and there is an absence of heat expanding iron and heat disintegrating stone. For joists, rafters, etc., the people of Buenos Ayres are compelled by circumstances to use hard woods. The rule in the construction of buildings is, that if a large number of small wooden rods, like canes, be placed—say 2 inches apart, like a grid iron—over two thin brick walls supporting their ends, a fire made below will burn through a few of the rods that are directly in the flame, and there the destruction ends. In the same manner, if a cart-load of shavings and pine wood were placed under a bed in a Buenos Ayres house, and other furniture piled thereon, and the whole set on fire, four or five of the joists of the floor above would be burned, but the bricks and tiles would fall through, but there the damage would end, for the house could not be set on fire. The mode of building is as follows, the material of the walls being brick: Each floor and the roof—for the latter is quite flat—is supported by joists of hard wood laid about 18 inches apart. Across these are placed rails of the same kind of wood, 3½ x 1½ inches, and the space between the latter bridged over by thin bricks, 13½ inches long; another layer of bricks is then put on, and over it a floor of tiles. The roof is made in exactly the same manner, except that it is laid in cement, and has a slant of 1 foot in 30 to 35. The doors and windows have no boxes, but only frames for the sash, and there is no lathing, nor wainscot, nor skirting. The doors and window shutters are of cedar, or some hard wood that is slow to ignite.

Peat charcoal is very easily and cheaply made. In West Cork, from time immemorial, country blacksmiths have been allowed as a perquisite to pick up all the small pieces of peat waste from the making up of peat stacks at the bogs by farmers and others. All the small pieces of peat are collected and laid in long narrow trenches, and then covered with soft peat or mud from the bogs. Fire is then applied, and then the peat allowed to smoulder slowly until it is converted into peat charcoal. This is the whole of the process.

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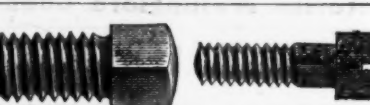
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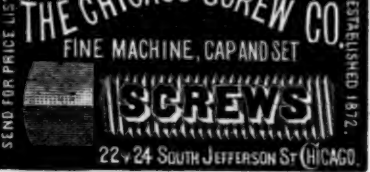
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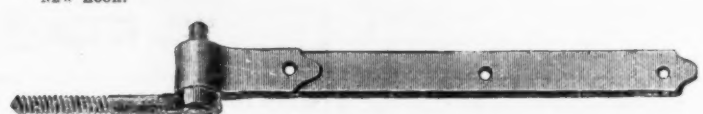
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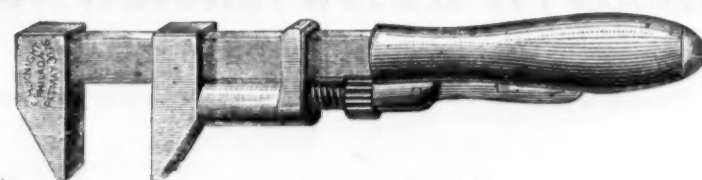
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# The Iron Age.

New York, Thursday, December 7, 1876.

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JAMES C. BAYLES, Editor.  
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## Our Production and Consumption of Iron.

There is an idea prevalent in all branches of the iron trade that the amount of iron made in the country has decreased very materially since the panic. This idea is founded upon a misconception. We have no figures at the present time showing the make for 1876, but we have for 1875 and previous years. Comparing the make of the different classes of iron and steel for 1875 with the make for 1871, we find in every item but one—a decided increase in 1875. In pig iron the increase was, in round numbers, 30 per cent.; in rolled iron, 33½; in Bessemer steel about three-

fold, and in other steel nearly double. Compared with 1872, the last full year before the panic, there is not such a decided showing, though in many forms of manufacture 1875 will show a very considerable increase over 1872. To indicate what the relative make of the two years was, we append the following table. The figures are from Mr. Swank's reports:

Products.	Make in 1872.	Make in 1875.	Percentage of make of 1875 to 1872.
Pig iron.....	2,854,558	3,966,581	79
Iron rails.....	905,930	501,649	55
All rolled iron, including rails, but excluding Bessemer steel rails.....	941,992	1,097,967	116
Bessemer steel rails.....	94,070	290,963	309
Kegs of cut nails and spikes.....	4,066,322	4,729,861	116
Crucible cast steel.....	29,560	39,401	134
Open hearth cast steel.....	3,000	9,050	301
All other steel except Bessemer.....	7,740	12,607	165

In view of the present great depression in the iron trade, these figures will create some surprise. Notwithstanding the cries of "dull trade" and "nothing doing," it appears that the country made three-fourths as much pig iron in 1875 as in 1872, nearly half as many tons of iron rails, one-sixth more nails, one-sixth more rolled iron of all grades excepting rails, a third more crucible steel, three times as much Bessemer and open hearth steel, and two-thirds more other steel.

Another thing to be noticed as a fact full of significance is, that the decrease has been only in the crudest forms of iron, that is, pig and iron rails, while the increase, as exhibited by the table, has been in the higher forms, such as rolled iron and steel, and we are confident that an analysis of the figures of rolled iron would show that, in its higher forms, such as sheets, hoops and cotton ties, the increase has been more marked than in bars. So, also, it would be found that iron has been rolled into shapes to a greater extent than heretofore.

There is another point which this table does not show, but which is of importance in connection with the increase in make. The consumption of iron has kept closer to the make in 1875, and this year as well, than in 1872. That is, the aggregate stocks of iron are far less to-day than four years ago. Consumers are buying only as they are pressed. The assortments in the hands of merchants may be as complete as ever, but the completeness is in having small lots of a great many kinds and not much of any one kind. Speculators do not anxiously inquire for "good things," and are not "snapping up" large blocks of pig or large lines of merchant iron. The yards of furnaces, mills and foundries, the warehouses of merchants and consumers, show no such stocks as in 1872.

To get at the true consumption of the country, however, we must consider the decline in imports. Pig iron fell from 277,232 tons in 1872 to 59,849 tons in 1875; bar iron from 118,237 to 26,552; band, hoop and scroll, from 11,708 to 429, and other irons in proportion.

But, notwithstanding all this, though the consumption of American made iron is nearly as great as in 1872, and though stocks are lighter, we have ruinously low prices, empty furnaces and idle mills all over the country. Why is this? The reason of the idle furnaces and mills is that, though the production of iron in 1875 is not much less than in 1872, the capacity for production has been largely increased in the intervening years. The number of blast furnaces completed from the beginning of 1872 to the close of 1875 was 153, all of them of modern construction, and, as the rule, of much greater capacity than those built previously. Some furnaces were abandoned, which left 713 completed stacks in the country, Dec. 31, 1875, against 571 Jan. 1, 1872, or a total increase of 142.

In regard to rolled iron we are not in possession of as satisfactory figures. Estimating from the best data we have, the capacity of our rolling mills, exclusive of rail mills, was increased from late in 1871 to the close of 1875, 400,000 tons per annum by the building of entire new mills. In many cases the capacity of old mills was increased. Two, three, or four more puddling furnaces were added, and in some cases large additions to plant were made. In Pittsburgh the puddling capacity was increased one-third in the time mentioned. The total capacity of the rolling mills, exclusive of rail mills, in the United States, Dec. 31, 1875, was 2,249,465 net tons. The same state of affairs exists in other branches, such as iron rails and especially in Bessemer, but this is so well known we need not go into details.

The reason of low prices is not so much overproduction as this enormous capacity for production. There are hundreds of idle furnaces, both blast and puddling, that are watching for anything like a re-

munerative market and brisk demand, and they will be lighted at once. Manufacturers are aware that stocks are low, but they know that the production of the country could be increased 30 per cent. within a fortnight and 50 per cent. within three months, and they fear to ask a fair price for their products.

It is difficult to see a way out of this. We are looking for a return of our former prosperity, but we already have it, so far as make and consumption of American made iron is concerned. What we really need is a demand far in excess of our greatest former requirements. To utilize our present productive capacity would require a consumption of at least 20 per cent. more iron than the country has ever used. This may come, but not immediately. In the meantime we must be satisfied with lower prices and smaller margins. Our mills need the highest business talent, and must consent to practice those smaller economies that our iron works knew nothing of five years ago. Anyone could make money on the margins of that time. It demands skillful guidance to avoid bankruptcy now.

## The Contracts for the East River Bridge.

In a recent issue of *Ryland's Iron Trade Circular* we find an article upon the Brooklyn bridge wire contracts, which contains a very large number of errors. The editor seems to be in rather an unhappy frame of mind about the contracts, and although he does not exactly cry "sour grapes," he says, in conclusion, that they are certainly beyond the reach of English manufacturers, simply because the bids must come through "well defined channels." In the opening of the article we find the following statements:

The fact that tenders for supplying 3400 tons of galvanized steel cable wire, for the erection of a suspension bridge across the East River, between Brooklyn city and New York, had been advertised in the English newspapers, seemed to buoy up the hopes of certain manufacturers on this side the water that the reported improvement in the United States trade was at length stimulating in a very legitimate fashion American business with the old country; and we were gravely told that such an application had never reached England from American consumers for a long time past. It is no doubt perfectly true that tenders have been invited here for the supply of this large quantity of steel wire for making the cables for the permanent suspension bridge just referred to; but it is also true that the two cables at present extending from New York to Brooklyn are formed of best English patent steel plow wire, the special manufacture of a Warrington firm of the highest repute.

The only true statement contained in this paragraph is that the tenders had been invited in England for the iron for both the temporary bridge ropes and also for the iron for the main cables. It is not true that the cables at present extending from New York to Brooklyn are of English steel plow-wire, nor were they made by the Warrington firm mentioned. The following are the bids for the wire rope for foot bridge, cradle cables and temporary structure:

J. A. Roebling's Sons & Co.....	\$47,000-67
Van Wart & Macoy.....	48,994-61
John & Edwin Wright.....	42,663-21
Warrington Wire Rope Works.....	53,457-93
Chrome Steel Co.....	39,849-19

From this it will be seen that the Warrington firm, which manufactures the steel plow wire were the highest bidders on this lot of wire. The Chrome Steel Company were the lowest and, of course, took the contract, and have supplied the material for the wires now in position.

In the next paragraph, speaking of the specifications for the wire for the bridge itself, the editor says:

It is well to remember, too, that the specifications for this 3400 tons of wire were drawn by an experienced engineer, who has had every assistance from his brothers—gentlemen who are thorough practical wire drawers and cable manufacturers. For these reasons we can well understand how the specifications in question came to be worded so stringently as to place them beyond the reach of English competition.

The specifications are by no means stringent for a manufacturer who can make a strong, uniform wire. Upon this point we have taken especial pains to satisfy ourselves. American engineers are accustomed to the use of very strong material, and in a work like the East River Bridge lightness is also essential. Without it the work is impracticable. We quote further:

What then are the facts? In the first place the wire must be made from the best cast crucible steel (no Siemens-Martin nor Bessemer will be accepted), hardened and tempered, and must, after galvanizing, stand a breaking strain of 90 tons to the inch, and be drawn in pieces of not less than sixty pounds, and to be delivered at the rate of 300 tons per month should the committee require it. Well, now, there are only two wire firms in England who can make this specific article—one, in the neighborhood of Birmingham, famous for the production of homogeneous wire for ocean cable purposes, and the other a no less celebrated maker of patent steel wire in Lancashire. Of this engineer who drew the specifications could not be wholly ignorant, since it was well known that these firms were not disposed to sacrifice their regular customers for the time being for the sake of this tempting order. So it is not uncharitable to look upon the whole affair as a "bogus contract," for we have the assurance, almost amounting to certainty, that not only the wire but the steel wire will be made in America.

In the first sentence of this quotation the writer appears to have mixed up in mind the specification for the foot bridge wire and those for the bridge wire. There is

the best reason in the world why the steels mentioned will not be used, and that is because they are not made sufficiently strong and uniform. After most careful consideration of the specifications, we fail to see anything which bars out from competition any wire that is sufficiently strong and uniform. Of the material it says: "Only a steel rod which will make a wire that 'comes up to the standard here laid down.' The chief points are as follows: It must be No. 8 Birmingham wire gauge, and shall run 14 feet to the pound. To increase its strength it must be tempered and hardened. The breaking strain is to be 3400 lbs., or at the rate of 160,000 lbs. per square inch; and just here we suspect the grievance lies: the English makers cannot produce so strong a material on a commercial scale. The limit of elasticity must be as high as 1600 lbs.—a very reasonable figure for any material having the required tensile strength. The modulus of elasticity must be between 27,000,000 and 29,000,000. In the damp sea air of our harbor painting cannot be depended upon for protection from rust, hence galvanizing has to be employed. Straight wire is needed, and as this is best obtained by the use of a certain patented process, the Bridge Company assume the royalty, so that, in bidding, the contractor is not hampered by the trouble and expense of obtaining a license. The tests are, we admit, somewhat rigid, but certainly no more so for English than for American manufacturers. The tests are by no means too severe for a good article, and are not of a character that the manufacturer of a wire fully up to the standard need fear. From one ring in 40 a 60 foot test piece is taken; from one ring in five a 6 foot test piece is taken; from every ring a 16 inch test piece is taken for tensile strain, and a 12 inch piece for bending. The aim of all this is to secure uniformity and nothing more; yet our contemporary seems to think all this has been done simply to exclude English manufacturers. If they are excluded, the probabilities are that they either cannot make wire good enough or else cannot compete in price. We do know that such wire has been made here, and can be again, and at less prices than any of the foreign makers have offered. The whole spirit of the specification, from beginning to end, aims to obtain, first, strength; next, size; and then uniformity. We quote further:

If we are correctly informed, overtures have been made to at least one English firm by American wire manufacturers to go over there with a competent staff in order to put Yankee workmen in the way of hardening and tempering wire by a patent process; and as considerable inducements were held out to this end, in simple consideration of this large order, it follows that the 'cute Yankees knew pretty well where the contract would be placed.'

This is no more a proof of knowledge of where the contract is to be placed than the fact that the bridge engineers specified for the use of a certain patented process in straightening and then secured the manufacturers from paying the royalty. If they wish to use an English method of tempering, they do well to secure the license, and it is a mere matter of justice to protect the bidders, whoever they may be. Again:

It may be that the wire for the cables upon which there will be the greatest strain will after all be obtained from one of the English wire mills, to which reference has been made; but, unless probabilities belie the situation, a large wire company at Worcester, Massachusetts, will get the lion's share of the contract. Nominally, the contract is an "open one," but really it is open to no firm or individual who has the temerity to take orders except through certain well defined channels.

With this bit of spleen the article closes, and in reply we would say that unless the strength of English iron is vastly better than that of any of its recorded tests which have come under our observation, there will be no English wire used in the bridge. The lesson of the St. Louis Bridge was a valuable one, and has not been forgotten by American engineers. Strong steel can be had and at a moderate cost; and when a great work like the East River Bridge is to be put up, the best possible material must be employed regardless of who makes it. If the best material can be had at home so much the better for us, and so much the worse for our foreign competitors. We give the subject somewhat more prominence than it deserves, for the reason that the article we quote from has been copied somewhat generally into American newspapers, and has thus had an opportunity of creating a false impression in the public mind.

## Armor and Guns.

In the contest between guns and armor, guns are once more ahead. When Cammel & Co. rolled the 22 inch plate for the Italian government, a section of which was on exhibition at Philadelphia, it was not only the thickest and heaviest plate which had ever been rolled, but it was capable of resisting the heaviest guns which had been made. Shipbuilders and engineers were delighted. The later production of a plate somewhat heavier, 24

inches thick, confirmed the opinion. It was thought that we were ready at last to build impregnable forts and ships, for the armor for them was ready. Unfortunately for the naval architects and military engineers, the gun makers were yet to be heard from. The recent trials of the hundred ton gun at Spizzia destroyed all these hopes. The 22 inch targets of both steel and iron were punched, and one was so completely demolished that, had it been a part of a ship's side, the ship herself would have been seriously injured. The plate was not only smashed but the backing was wrecked. The iron plate held together a little better and was only punched, but the 2000 pound shot came through the backing and all, and still had a considerable velocity. The gun, in fact, proved itself so powerful that a 24 inch plate would be required to match it. Not a ship afloat could keep out a shot from this gun, and it has been even suggested that in case a turret were loaded with iron sufficient to resist it, it would be knocked overboard bodily. Plating can be increased in thickness indefinitely, and 36 or even 40 inch plates are not beyond the possibilities; but while such plates are all well enough for fortifications, the naval architect shakes his head and wonders what manner of ships he shall build to carry 25 or 30 inch armor plates at sea, and at a speed of from 15 to 16 miles per hour. A ship of less than 10,000 tons will not answer, and it is not quite certain that a larger one will be any better. It is becoming a serious question whether it is worth while to carry any armor at all. There is no reason to suppose that a 30 inch plate will be able to resist the guns which may be built, for the 100 ton gun is not the limit of size by any means. Given guns capable of punching the armor plates of a ship, and it makes little difference whether a ship is plated or not when she goes into action; and so far as the sailors are concerned, we fancy that they would a little rather have the unplated vessel than the "iron coffin." In this country we did a very wise thing to get rid of as many of our iron-clads as possible. When we want them we can build; had they been kept the expense would have been wasted, and we should have had to build new ones in spite of ourselves. If nations must go to war they must have new ships to keep up with the guns, and at present those without armor stand as good a chance in action as the iron-clads, and better if they have more speed.

## Cross Purposes.

In an article on the Centennial Exhibition and its results, the *Engineer*, with that sadness and sweetness which has always characterized its comments on American events, gives utterance to the following opinions:

The history of the Centennial reflects little credit on those officially connected with it who are not Englishmen, and none at all on the Americans. From first to last English exhibitors, at all events, have been incessantly harassed by the most vexatious and even insulting demands. The sales effected by them were comparatively trifling, and it is due to Americans to add that as they left nothing undone to render the enterprise completely disappointing to every one, they have been completely successful. The despicable quarrels between the dignitaries of Philadelphia and the Exhibition authorities put all right-thinking Americans—and they are not few—to the blush. We could afford to pass over these petty disagreements with a smile if they had been isolated in their effect on the dignity and liberal feeling which they indicated pervaded every department of the show, and it follows that large as the Centennial was, it will always have the reputation of being the smallest and meanest exhibition ever held. From first to last there was manifested by the Americans a total absence of generous feeling, not only toward strangers, but amongst themselves. Of course, there were honorable exceptions, but the actions of some men whom we could name—representatives of well-known firms—only render the rest of the picture darker by contrast. In certain cases judges were unable to hold competitive trials. So bad was the feeling among rival patentees, that they knew it would be simply impossible to carry out a competition which would be pronounced fair by anyone but the prize winners; and few men have the courage to incur the torrent of abuse which would in any case have been poured on them by the corrupt press. The protection system worked in a way so oppressive and insulting that at last the exhibitors, provoked beyond endurance, turned at bay on their hospitable entertainers, and declared that unless a change was made for the better they would cover up their cases and bring the show to an untimely end. Of the extortion and rapacity of the good people of Philadelphia, it is enough to say that even the American press denounced it at last as scandalous. We have not said one word indeed connected with this dead exhibition which cannot be fully confirmed from the admissions of American newspaper writers.

We hope no American reader of the *Engineer*—we believe it has some—will imagine for a moment that this extract gives expression to public opinion in England—nor, for the matter of that, in the *Engineer* office. In writing thus about the Centennial the conductors of that journal are only carrying out their one policy of editorial management—to differ from *Engineering* on every subject concerning which a difference of opinion is possible. *Engineering* found in the Centennial much to commend. Its criticisms have been fair, well considered and valuable, and its approval generous and hearty. Here was an opportunity for the *Engineer*. It had a chance to take a position diametrically op-



posed to that taken by *Engineering*, and it would have been false to its traditions if it had failed to seize the opportunity. If *Engineering* had taken the opposite ground, the *Engineer* would have pronounced the Centennial the greatest success of the century.

The intelligent reader of both *Engineering* and the *Engineer* cannot have failed to notice that they stand to each other in a position very similar to that of the *Gazette* and the *Independent*, of Eatonsville. The function of each seems to be to show that the editors of the other have an inherited fondness for thistles, and to construe whatever they may say into the *He! Haw!* so familiar to British ears. Fortunately for *Engineering*, it is usually the first to express its opinions on subjects which interest its readers, and it is therefore less hampered in these matters than its neighbor, which usually waits to find out which side it must take until it knows which side *Engineering* has taken. This may be pleasant diversion for the editors of these journals, but we should think it would be monotonous for their readers in the course of time.

#### The New Dutch Ship Canal.

The conquest of Holland by the Dutch was supposed to have been consummated a long time ago, when it was announced that the Dutch had taken Holland. As a matter of fact, however, it must be said that they are still at the work of conquest, in which every foot of advance must be contended for with the sea, which has as little respect for territorial boundaries now as in the time of King Canute.

In Holland, however, thanks to the skill of the Dutch engineers, the land is making constant inroads upon the sea. While gaining new territories from the water they are not forgetful of their water ways, and one of the first things taken into the calculation when a lake or arm of the sea is to be reclaimed, is the way in which the navigation is to be provided for. This object accomplished, and abundant means provided for the accommodation of shipping, they begin the work of driving out the sea in earnest. Accustomed for years, we may say for centuries, to the construction of ship canals, they do not hesitate to undertake projects in what may be termed marine engineering which would, to say the least, be undertaken with hesitation by other nations. The monster canal of the world, the new canal (Nieuwe Diep) connecting Amsterdam with the North Sea at the Helder, was undertaken in order to give an outlet to the sea and allow the largest ships to reach the city. This canal was made necessary by the storms in the early part of this century which practically closed Zuyder Zee to sea going ships, by rendering its channels shallow and more difficult of access. The sea is in fact gradually being filled up by the action of the storms and the silt from the land. The new or North Holland Canal is some 50 miles in length, 21 feet deep and 125 feet wide. The locks are of enormous size, capable of passing a ship of more than 300 feet in length; in fact anything that floats on that draught of water can pass through this enormous artificial arm of the sea. This canal did not enter the sea at the point nearest the city, and another canal has long been projected in connection with the project of draining the Zuyder Zee. The latter task is of such grand proportions that no nation less skillful in such matters than the Dutch would dare venture such an undertaking. Yet they will not only propose it, but carry it into execution, and in time leave nothing of this dreaded sea but a network of canals. The whole length of the Zuyder Zee is some 60 miles. At the mouth of this gulf, or sea, the width is about 20 miles, while in the wider portions it is nearly double this. By the drainage of the central portion of this sea, some 500,000 acres of land would be reclaimed and room made for a population of about 200,000 persons.

The canal of which we speak has been but very recently opened. The following from the London *Times* gives many interesting facts relating to the canal:

Amsterdam, which sprang into sudden importance when the Spaniards had ruled Antwerp, had begun during the last few years to see before its eyes the danger of its joining the melancholy sisterhood of the dead cities of the Zuyder Zee. The channels by which the riches of the world were once brought to Amsterdam, to be reshipped at the profit of the Dutch capitalists, have become too shallow for the great vessels of burden which carry the merchandise of modern days, and even the spices of the Dutch East Indies, the coffee of Java, the sugar, indigo, tobacco and rice from the tropical dependencies of Holland in the East and West go now, by preference, to Rotterdam, which has long been growing at the expense of its more famous neighbor. The old route from Amsterdam to the ocean was by the Zuyder Zee, but the storms and sandbanks of this dangerous gulf led, in 1819, to the construction of the North Holland Canal from Amsterdam to the Helder, the northernmost point of the province of North Holland, over fifty miles from Amsterdam. Why this route was chosen instead of the short cut now made is hard to understand. But provincial interests prevailed over the claims of the mercantile capital, and it was reported for our own days to bring Amsterdam by

a cut of 15 miles within an hour or two at ordinary tides of the German Ocean. What the effect will be upon the commerce of the world must be left to time to determine. The citizens of Amsterdam possess shrewdness enough to offer a formidable competition to any rivals in trade, and they possess great accumulations of capital. It takes one or two days for large vessels to reach Amsterdam from Nieuwediep, as the port at the Helder is called, and they often suffer much longer delay from contrary winds. They cannot come at all till they have been relieved at Nieuwediep of part of their cargo, which is sent on by lighters. The result is that charter parties often contain an express stipulation to the effect that though the vessel may be ordered, perhaps, to any port of the British Isles or on the Continent of Europe between Havre and Hamburg, she shall not be compelled to go to Amsterdam. The new canal will probably put an end to this invidious exception.

Although the cost of this magnificent work has been about \$10,000,000, there is little doubt that the undertaking will pay. In advantage to the city it certainly cannot fail to be a profitable investment, even though the receipts are not sufficiently large to more than cover the running expenses. Judging from the fact that some thirteen million cubic yards of excavation has been done, and the length of canal banks on the main canal and its 10 branches is somewhere in the neighborhood of 40 miles, the work cannot be considered an expensive one. The depth of water, when completed, is to be ample, some 23 feet, great enough for any vessels except the heavier class of deep loaded Atlantic steamers. It has been compared with the Suez Canal, which is a trifle deeper, and a little longer; but it seems to us that between the two there can be no comparison whatever since this is so much greater an undertaking. That was a project in which the whole world was interested, while this is peculiarly a local enterprise of a single country. The Suez Canal has the commerce of two continents upon which to levy toll, while this one depends upon what comes to a single great city. It is plain, we think, that this has been a greater undertaking in proportion to the gain than the other; it certainly has needed greater pluck, skill and judgment. The new canal was opened upon the 21st of November for the general commerce and the tariff per ton announced. This is expected to produce the necessary revenue to provide for the maintenance of banks, locks, lights, etc., etc.

#### The British Arctic Expedition.

The British Arctic Expedition has just returned unsuccessful, after having been absent one year. When it left the English papers told us that the outfit was the most complete ever taken out by a polar expedition, that it was sufficient in quantity for some four or five years' stay, and that, if there were no insurmountable obstacles, the expedition must be successful. The ships, it seems, encountered no great difficulties, sailed further north than ships had ever been before, and found everything favorable to success, but as often before in British naval history, "some one had blundered." Scarcely made its appearance, and, at the first opportunity, the expedition returned, having practically accomplished nothing. A long shore line has, it is true, been added to both the Greenland and American coast, and the explorers went within 400 miles of the pole across the ice. Another year would, in all probability, have given us more knowledge of this circumpolar sea than we have ever had. It is even possible that, during the late summer of the present year, the pole itself could have been reached by the vessels. Ice of great thickness was encountered, but it was not grounded and might have broken up; at least it was by no means to be regarded as a fixed barrier. The situation was indeed hopeful, yet all this advantage had to be abandoned; the well fitted expedition was attacked by scurvy, and the cause does not yet appear, but a blunder it must be. Arctic voyages are no longer necessarily attended by this scourge, and the British admiralty probably will have the satisfaction of thanking themselves for the failure.

#### New Publications.

NAME OF STOVES, RANGES AND FURNACES. Prepared under the auspices of the National Association of Stove Manufacturers.

A list of the names of stoves and furnaces in use has long been needed by founders, while a directory of stoves which should give their names, class and by whom manufactured has been long wanted by the stove trade of the country. This want has been particularly met in the volume before us. Unfortunately, it is not complete, although this is not the fault of the able secretary of the association, Mr. Josiah Jewett. Only 150 manufacturers responded, and it was impossible to get the lists of the remainder, although seven separate applications were made. This indifference to the completeness and accuracy of records and books of reference is noticeable in all trades, and to compile the statistics of an industry with accuracy is impossible, for the reason that there are always some who withhold information which they could and should give. It is

hoped, however, that the omissions will be corrected in future editions. The secretary has a register prepared in which all new names are to be written as they may be reported from time to time, and before a revision of the printed list is needed we presume many of the firms which did not respond in the first instance will have concluded to give the information needed.

The volume before us contains the names, in use at this time, of 4275 stoves, ranges and furnaces. Opposite each name is the description of the stove, furnace or range to which it belongs, and the kind of fuel burned in it. The names of the stoves made by each founder or manufacturing house are given together in the body of the work, but the double index is so thorough that one can find any name, whether he knows the maker or not.

The value of such a register will be seen at a glance by every manufacturer and dealer. The naming of stoves is a matter of no little trouble. The maker desires to select some name at once euphonious and easily remembered, and at the same time avoid infringing the copyright of any other maker. If he finds a name that suits him he cannot assure himself that he has the right to use it without a search at the Patent Office. It was to obviate this difficulty that the National Association of Stove Manufacturers authorized its secretary to compile the name register. To supplement the book a register in manuscript will be kept, and a note to Mr. Jewett will secure for a manufacturer information as to whether the name or names he wants to use have been placed on record since the book was published.

The utility of the register to the dealer lies in the fact that it gives him the name and address of the makers of any stove he wants to purchase or know about. For many good reasons the names of abandoned stoves have not been given. We can honestly compliment Mr. Jewett not only upon the success of the work of compilation and arrangement, but upon the beauty and excellence of the mechanical execution. The book is beautifully printed on heavy paper, in large clear type, and with wide margins. We are not informed whether it is printed for gratuitous circulation or for sale.

#### Bessemer Steel at the Centennial.

(Continued.)

THE EDGAR THOMSON STEEL COMPANY, LIMITED.

In Main Building, T 66, the exhibit of this company occupied a prominent position fronting on the circle at the intersection of the main aisle of the south span of the building with cross aisle C, and consisted of the following: Two steel ingots, each of the size required to make four rails and weighing about 2800 lbs.; one ingot cast under Wm. R. Jones' process of compression by steam—this ingot was polished to show its solid surface, and looked like a forging; a Bessemer steel crank forged and polished; a four rail bloom, being the product of an ingot similar to those first named, and weighing about 2700 lbs.; a show case containing pieces of rails polished and nickel-plated, and one twisted rail polished but not plated; also, one pair of locomotive side rods, made by the Pittsburgh Locomotive Works, from Bessemer steel furnished by this company, and two bent rods, one to the form of the letter U and the other to the letter S, without crack or flaw. The outside exhibit was situated on the south side of the Main Building, between it and the Mineral Annex, extending from doors C to D of the Main Building, and consisted of the following: One steel rail 82 lbs. per yard, 120 feet long, weighing 2500 lbs., and being the longest and heaviest rail in the world; one rail 62 lbs. per yard, 98 feet long; one rail 62 lbs. per yard, 82 feet 5 inches long; one rail 67 lbs. per yard, 62 feet long; one rail 60 feet long, 60 lbs. per yard, twisted cold with 20 complete revolutions without crack or flaw; two rails, each 30 feet long, that have never been "cold straightened," being the product as taken from the new "hot bed" in use only at these works; one rail 20 feet long, twisted cold, being a part of the first rail made at the works. The long rails above named were all made at the first trial from the ordinary steel that was then being used to fill an order, and of the pattern then being rolled, that of the New York, New Haven and Hartford Railroad Company. The Edgar Thomson Steel Works are located at Bessemer Station, 11 miles east of Pittsburgh, on the main line of the Pennsylvania Railroad, and on the Pittsburgh Division of the Baltimore and Ohio Railroad. The property of the company extends from the Pennsylvania Railroad to the Monongahela River, and consists of 100 acres of ground. The works are erected on the portion of the property lying between the Pennsylvania and the Baltimore and Ohio Railroads, with tracks connecting with both roads and a track leading to a landing on the Monongahela River, where a dock has been built for loading rails and an elevator for receiving coal. The ground was broken for the erection of the works in April, 1873, and work was commenced on the buildings in May, 1873. The completion of the works was delayed (although not at any time entirely suspended) in consequence of the financial panic in September, 1873, so that they were not completed until August, 1875. The first blow was made on August 28, 1875, at 5:15 p. m., and the first rail was rolled on September 1, 1875, at 12:55 p. m., both being entirely successful. The works at present consist of a converting department with two 6 ton converters, and all the appliances necessary to their operation; a boiler house containing 20 tubular boilers, which supply all the steam used at the works; a rail mill containing 7 Siemens heating furnaces; a blooming train with Fritz tables, a rail train, a hot bed of new construction, a hot saw, two cold saws and the usual finishing machinery; a producer house with 5 stacks of producers for supplying gas for the furnaces; a machine shop and blacksmith shop with a store room attached; a pattern shop, a locomotive engine house, and the necessary

sheds for storing materials. The company expected to proceed very soon with the erection of two 18 foot blast furnaces of the most approved pattern and type, arranged with special reference to running the metal from the furnaces to the converter without remelting, a practice which has not yet been introduced in this country, although used at many of the works in Europe. A system of narrow gauge tracks connects the several buildings, on which a locomotive is used, its principal work being to transfer the ingots from the furnaces to the heating furnaces, which is done without allowing them to cool. The works were run on single turn until the middle of March (about 6½ months), since which time they have been run on double turn. The product of the first year's operations has been as follows:

	Ingots, Tons.	Rails, Tons.	Merchant Steel, Tons.
1875.			
September.....	1,554	1,119	23
October.....	2,318	1,818	9
November.....	2,673	2,145	4
December.....	2,094	1,480	—
Four months.....	8,639	6,562	36
1876.			
January.....	2,550	2,095	58
February.....	2,407	1,811	19
March.....	4,206	2,900	73
April.....	1,088	2,652	46
May.....	5,401	4,128	248
June.....	4,290	3,346	41
July.....	4,510	3,548	118
August.....	4,796	3,873	156
Total.....	40,867	30,775	789

The above shows an output of 31,564 tons of finished product for the first year's operations, during over one-half of which time the works were only running on single turn, a product heretofore unequalled in the history of any works in its first year in this or any other country. The rails produced during the first year's operations have been very widely distributed through 19 states of the union, extending from Massachusetts on the east to Texas in the southwest, and including California. The location of the works in its proximity to the furnaces of Pittsburgh and the Mahoning and Shenango valleys, in which are produced from Lake Superior ores the best Bessemer metal made in the United States, insures a supply of materials of the best quality, while their being located in the midst of the best and cheapest fuel known in the world adds greatly to the economy of their operation, the result of which has been a product unsurpassed in quality by that of any Bessemer works in the United States.

The principal exhibit of THE ALBANY AND RENSSAELER IRON & STEEL CO., of Troy, N. Y., was located in Sec. 8, 68, Main Building, and embraced a display of the large range of manufactures of that company, including pig iron, steel and iron rails, steel shafting, iron and steel merchant bars, finger bars, steel crowbars, iron and steel railroad axles, steel railroad frogs (Close's patent), iron and steel horseshoes (Walker's patent), steel carriage axles, iron and steel rails, iron and steel rivets and spikes, iron and steel fish plates, bolts and nuts, steel wagon and carriage tire, and various articles, such as hammers, knives, taps, etc., made from steel produced by them. In respect to the variety of forms into which Bessemer has been worked this exhibit was by far the most interesting in the whole Exhibition, and was well worthy of study, as showing the capabilities of the metal. Especially is it important in view of the present overproduction of this metal. The exhibit was arranged with great taste and the quality of the material shown was made evident in various ways. The steel shafting was turned and polished to show its wonderful freedom from defects. A whole rail was polished, and another one polished and then twisted, this having been done to develop flaws, if such should have existed. Another steel rail was twisted without being polished, and a certificate from the officers of the company stated that these rails were taken from a lot then being rolled for the Delaware and Hudson Canal Co., and that they as well as the other articles shown were taken from the regular product of the works, no special stock having been used in a single instance. There were iron and steel railroad axles shown bent double cold, and steel carriage axles tortured in all kinds of shapes. The steel railroad axles were turned and polished, and were so perfect that not a single seam or flaw could be detected. A display was made of connected links formed of steel carriage tire, running from the larger sizes down to the smallest and showing perfect weldings. Sand only was used in accomplishing this. In the show case a steel polished ring was shown, in which the weld is so perfect that it is utterly impossible to detect where it is made. The analysis of the steel in this ring is given as follows:

Carbon.....	0.25
Phosphorus.....	0.066
Sulphur.....	0.065
Manganese.....	.12
Silicon.....	0.032

The company also showed an immense block of new bed lime ore, with pieces of polished steel made from pig iron produced from similar ore, and claim that owing to the superior chemical constitution of the iron from which they make all their steel, their rails possess superior merit. Putting aside all questions of strength and wear, the time must come when worn-out steel rails have to be utilized. If the steel in them is of a fitting quality, then they can be rolled directly into merchant sizes; or they will command a lighter price for Siemens-Martin purposes. The Albany and Rensselaer Company claim that their rails have this merit. Among their most prominent specialties we found steel rails and Walker's tempered, forged and hammered iron and steel horseshoes. The steel axles, from their greater stiffness, can be cut lighter than an iron rail, and at the same time possess more strength; they can be driven into harder wood, and are entirely free from waste. For clinch nail purposes they are wonderful. It is claimed the Walker horseshoes have superior wearing qualities, and, in fact, samples are shown with certificates attached which prove the claim to be well founded. A common prejudice against Bessemer steel

horseshoes has been the supposed difficulty in welding on toe calks, and to disprove this we find samples with the steel calks welded on and then polished over the line of jointure, sand only having been used as a flux. This company also had a very fine display in the main aisle of the Government Building, which is to remain as a part of the Natural Museum.

This is in the form of a six-sided star at the base, with an hexagonal column resting upon it. From the points of the star rise (1st) a 4 inch square piece of steel, polished; (2d) a twisted rail, polished; (3d) a polished axle; (4th) two pieces of angle iron, polished; (5th) a rail; (6th) a turned axle. The edges of the hexagon are formed of crowbars, and on it are shown the first Bessemer axle made in the United States, and also the first Bessemer boiler plate, as well as steel worked into various forms such as were shown in the Main Building.

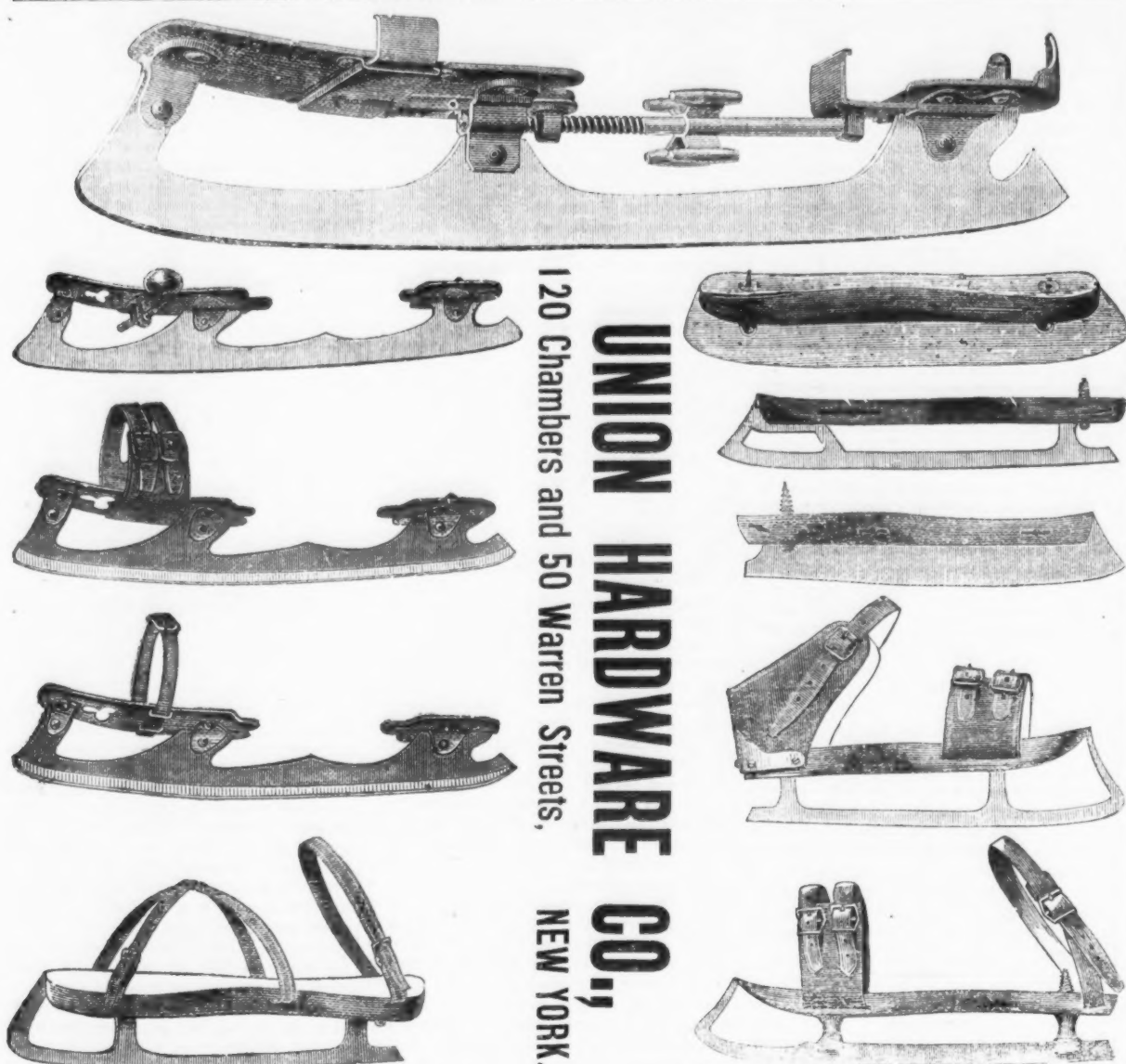
#### THE CLEVELAND ROLLING MILL COMPANY.

whose display was at T 60, Main Building, are among the most extensive manufacturers of iron and steel in the country, owning their ore, mining their coal, having extensive blast furnaces, as well as iron and steel mills, comprising both Bessemer and Siemens-Martin plants. We have already spoken of the latter, and shall mention their iron exhibit under its appropriate head. The Bessemer works of the Cleveland Rolling Mill Company were started in 1867, with a pair of five ton converters, but this number has since been doubled. The main product of their Bessemer works is, of course, rails, but this company have devoted considerable time and expended a large amount of money in developing other uses for Bessemer, with very good success, as their display showed. In connection with the rail part of their business they exhibited a three rail bloom 7½ inches square, which has been cut at one end and broken at the other, showing a very good fracture. There are also three pieces of Bessemer rail, each 7 feet long, taken from an ordinary lot of rails without any selection, each twisted cold four complete turns without causing a flaw or break of any kind in the metal. One of the most telling features of the display was a steel rail which was laid on the Lake Shore Railroad some six years ago, and was in constant service until taken up for exhibition. This rail has outlived 34 good iron rails, has been traversed by locomotives 766,500 times, by 6,387,500 cars and 143,080,000 tons weight. It would be hard to find a better illustration of the economy of Bessemer steel, or the vast results it will accomplish in cheapening transportation. In other forms of Bessemer they showed a very fine collection of wire, screws, horseshoes, points and heel points, steel tire, etc. The wire department is represented by the contents of 15 cases, which contain every possible style, variety and quality of wire, drawn, square, oval, round, twisted, hollow and triangular, one case alone containing 60 different kinds, from the coarsest to the finest, some drawn to the diameter of a hair, and so pliable as to admit of being used as thread. Another case contained a pyramid five feet in height, composed of coils of different sizes and qualities. One of the curiosities in this department was a long strand drawn into the shape of a carriage whip, seven-eighths of an inch in diameter at the butt, and tapering to almost impalpable fineness. A bar of Bessemer horseshoe steel, grooved and prepared for cutting and forming, has 8 twists in its length of two feet, and shows no sign of flaw or weakness in any part. The steel screws exhibited by the Union Steel Screw Company, which are practically the same as the Cleveland Rolling Mill Company, have attracted a good deal of attention.

The Philadelphia *North American* says: The Permanent Exhibition promises to be a grand success, the applications for room being already so numerous as to more than fill the Main Building, and that fact will give our readers an idea of what the exhibition will be. Many foreigners have applied for space, and it is believed that nearly all the countries represented at the Centennial Exposition will secure room in the Permanent Exhibition for the display of their goods. Those articles exhibited during the summer and fall will generally be removed, to be replaced by other and still better ones, fresh from the manufacturers and artists of this and the old world. The manager has received such an immense number of applications that he will be compelled to make selections from the mass of articles submitted, and by so doing those accepted will be of the best quality, and in numerous instances superior to those of the same character displayed at the recent Exposition. The directors design to improve the conveniences of the Main Building in every possible manner, especially in widening the passages and avenues, and introducing such other changes as may be deemed necessary to facilitate the movements of large crowds and give visitors better opportunities to view the exhibits. The success of the Permanent Exhibition is assured beyond a doubt, and we have no fears but it will be conducted in such an enterprising and liberal spirit as to merit the support and well-wishes not only of Philadelphia, but of the country.

The combustion of iron in air is a chemical phenomenon now made comparatively easy to the experimenter. The most practicable method is to take a straight bar magnet of some power, and sprinkle iron filings on one of its poles. These filings arrange themselves in accordance with the lines of magnetic force, and, however closely they may appear to be placed, of course no two of the metallic filaments are parallel, and consequently a certain portion of air is inclosed as in a metallic sponge. The flame of any ordinary spirit lamp or gas burner readily ignites the finely divided iron, and it continues to burn most brilliantly for a considerable length of time, the combustion being apparently as natural and easy as that of any ordinary substance, and the light normal, though vivid.





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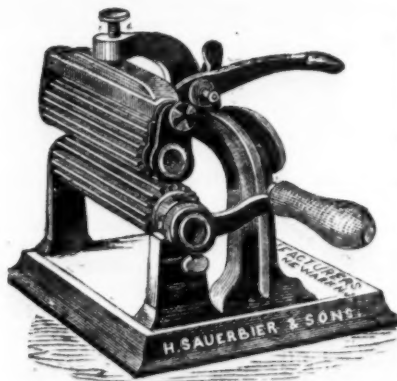
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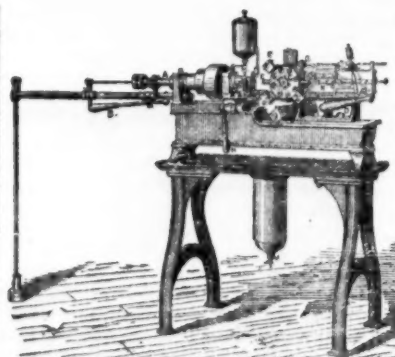
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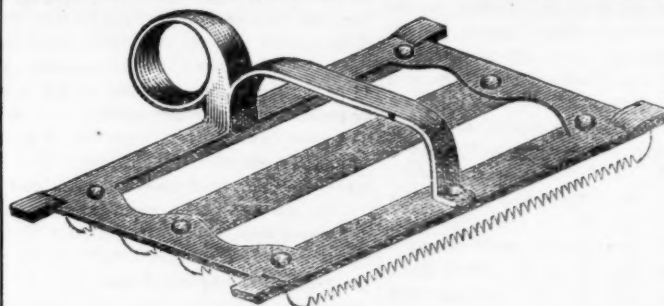
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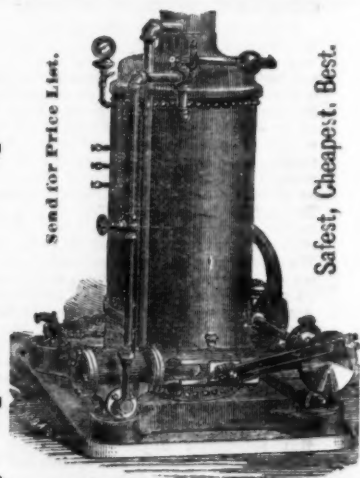
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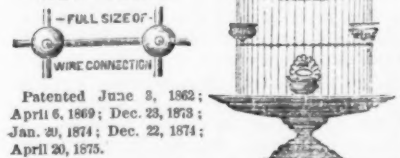
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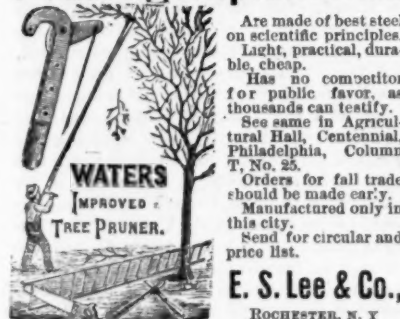
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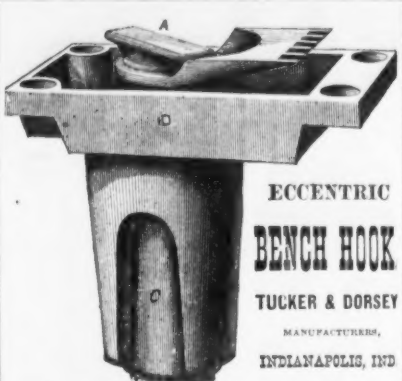


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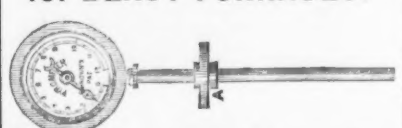


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Over 300 "Gauntlett" and 100  
Portable Pyrometers are now in  
use at Blast Furnaces.  
E. Brown's Portable Blast Gauge  
for the plug hole, Steam Gauges,  
Blast Gauges, Mercury Gauges,  
Recording Steam Gauges, Engine  
Counters, Indicators for ascertain-  
ing the Horse Power.

ALSO  
**REVOLUTION  
INDICATORS.**

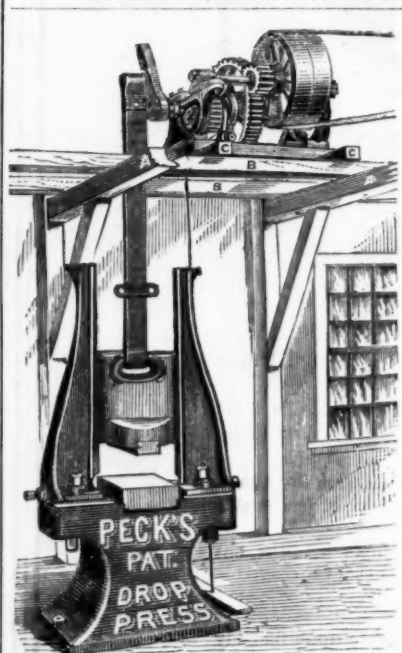
which constantly indicate without the use  
of a watch, the number of turns per minute  
made by a Steam Engine.



**Tackle Blocks**  
Of all Description.  
**SHIP BLOCKS,**  
Well and Ships'  
**PUMPS.**  
Patent Pressed PUMP LEATHERS.  
Dealer in **LIGNUMVITAE WOOD.**  
**JOSEPH THOMPSON,**  
Factory, 36 Burling Slip, 86 South Street,  
NEW YORK.

**A. H. SPENCER,**  
Solicitor of Patents,  
And Expert in Patent Cases.

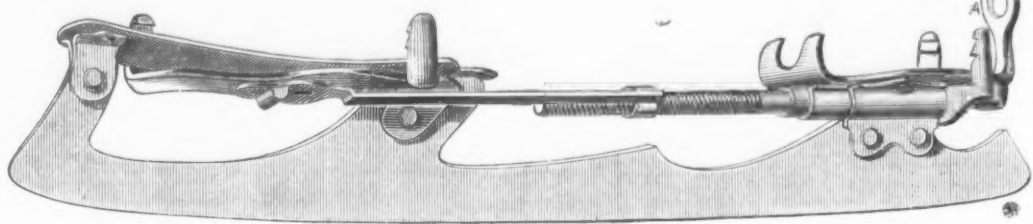
28 State St., Room 19, Boston.



I have the largest and best stock of **Drop Press**  
Patterns in the country—suitable for Forging, and all  
kinds of Sheet Metal work.  
**WHY THE BEST:**  
It requires less power, works faster, gives a harder blow  
with same weight of hammer, the rebound of the ham-  
mer is caught without lessening the force of the blow,  
the blow is uniform and not affected by variations in  
the speed of the driver. It is always in order. The  
**Drop Press** a specialty.  
**MILO PECK, New Haven, Conn.**

### New Patent Lever Screw Skate.

E. H. Barney, Springfield, Mass., and No.  
82 Chambers street, New York, successor to  
Barney & Berry, the well known skate manu-  
facturers, has added to the assortment of this  
brand of skates the new pattern lever screw  
skate, styled No. 6, which we illustrate in the  
accompanying cut. This skate can be used as  
lever clamp or screw clamp, or both. The  
manufacturer claims for it that it is the only  
self-adjusting skate yet invented, working all  
the clamps together without the aid of a key.  
The chief advantage claimed for this skate is  
the ease with which it is applied to the boot,  
requiring only a few seconds to place it securely  
on, while the operation of removing the skate is  
accomplished in even less time. The  
parts are independent, working without the  
aid of rivets or screws, and can be easily  
taken apart and put together without the use  
of tools. The materials used in the construc-  
tion of this skate are of the same high quality



NEW PATENT LEVER SCREW SKATE.

that has given to the brand of Barney & Berry  
an enviable reputation in the trade. Barney &  
Berry's skates were awarded the highest pre-  
mium at the Vienna Exposition in 1873, and at  
the Centennial.

### BUSINESS ITEMS.

#### MAINE.

From the Belfast *Republican Journal* we learn  
that the buildings for Castle's Foundry and Ma-  
chine Shop, now being erected by Mr. Castle on  
the site of his foundry that was destroyed in  
the great fire of 1873, are now nearly completed  
outwardly. They have a street front of 180  
feet, with a depth of 130, are three stories in  
the rear and two in front. The casting room is  
100 by 60 feet, and has smelting cupolas, one 24  
and one 40 inches in diameter, and each 40 feet  
high, beside five crucible furnaces for brass  
work. The chimney is completed, is 92 feet  
high, 6 feet 6 inches square at the foundation, 3  
feet 9 inches at the top, and it will be sur-  
mounted by a cast iron cap. The engine, a  
very handsome one of 15 horse-power, is on  
the spot. There are three large ovens for cores  
for castings, one oven being 22 feet long, 10  
feet wide and 10 feet high. A reservoir supply  
of water ample for all purposes has been se-  
cured. A fine yard in the rear contains a half  
acre of land with the railroad track through it,  
and beyond that an excellent wharf privilege.  
The machine shop will be supplied with an  
abundance of the best tools, adapted to any  
job of work in the machinery line. Beside the  
general work of such an establishment, the  
foundry and machine shop will make specialties  
of stone polishers, and a simple and serviceable  
steam pump of Mr. Castle's invention. This  
will be an important addition to the productive  
industries of the city.

#### MASSACHUSETTS.

The Valley Machine Company, of Eastham-  
pton, have just shipped to Mr. Emil Brugach,  
Egypt, one of their steam pumps for his own  
use. Mr. Brugach was chief Egyptian Com-  
missioner at the Centennial, and secretary of  
the Board of Judges of Awards on Steam  
Pumps, Fire Engines and Hydraulic Machinery.  
The Valley Machine Company are quite right in  
regarding the order as a very considerable  
compliment.

A local newspaper says: The Douglass Axe  
Company are working out their last order, but  
will probably receive others in time to continue  
operations.

The Florence Sewing Machine Company are  
receiving large foreign as well as domestic  
orders for their oil stoves, and will at once in-  
crease their production. The sewing machine  
business is dull, however, and the company sus-  
pended work on that part of the sewing ma-  
chine work of which they have a surplus on  
hand, on the last instant.

The new watch factory at Riverside, in Au-  
burndale, has begun running, and calls its  
watch the "Auburndale Rotary."

The Valve Works, Springfield, find business  
widely distributed. They are filling a Ken-  
tucky order for three 18 inch gas valves, a  
Peru (South America) order for 40 four inch,  
two-nozzled hydrants, and a Texan order for 40  
more.

The managers of the Clinton Wire Cloth  
Works have recently completed one of the most  
extensive dry-houses for the drying of wire  
goods in this country. The building is of brick  
and granite, and 180 feet high and 35 feet  
square, which increases the capacity of the  
works 100 per cent.

#### CONNECTICUT.

The firm of Reynolds & Co., screw manu-  
facturers, of New Haven, on Friday shipped five  
molding machines to Watson, Gow & Co.,  
Glasgow, Scotland.

The Hart Manufacturing Company, of East  
Berlin, have added to their main building, and  
built a small brick structure for jspanning pur-  
poses.

The Norwich Pistol Company have been offered  
a contract to make 40,000 pistols.

P. T. Barnum is trying to induce English  
manufacturers to establish works in Bridge-  
port. The Hon. John Bright, writing to Mr.  
Barnum, declines to establish a carpet factory  
there, because of our protective tariff. Another  
great English carpet manufacturer, who lately  
visited at Waldemere, writes that he intends to

visit Bridgeport again in the spring, with a view  
of establishing a carpet factory. He will come  
because our tariff renders English competition  
impossible. The same reason induced Thomp-  
son & Co., of London, corset manufacturers, to  
open a branch in Bridgeport.

#### RHODE ISLAND.

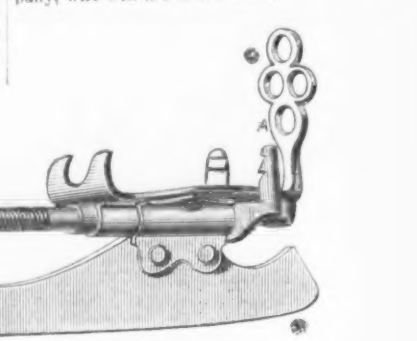
Cottrell & Babcock, printing press manu-  
facturers, at Westerly, resumed business Thurs-  
day, having compromised with their creditors.  
NEW YORK.

Little is doing at the iron works at Troy at  
present. Last week at Burden's mills, on the  
flats, a few furnaces were running and the  
horseshoe factory was in operation. All their  
other works were idle. At the Rensselaer Iron  
Works only the merchant mill was in operation,  
and at the Albany Works the nail plate mill and  
horseshoe factory. The Star forge was to have  
started up Monday. There are no indications  
at present of a resumption of work at the  
Bessemer Steel Works, Rensselaer Works, or  
other mills now idle.

*Delta* says: It is authoritatively stated that  
the West Hamburg Iron Works will soon re-  
sume operations. The works are owned by the  
Reading Railroad Company, but have been  
leased by a Schuylkill county party, who will  
control the same after Dec. 1. This was the  
mill at which the Henderson process was  
worked.

The employees of a portion of the works of  
the Pottstown Iron Company commenced  
work Monday, Nov. 27, at a reduction of 10 per  
cent. upon their wages.

At the furnace of the Pottstown Iron Com-  
pany a large tank is being placed in position,  
to be filled with water, and in which the cinder  
from the furnace is to be cast. When taken  
out again it is to be broken and crumbed so as  
to be of service to the Reading Railroad Com-  
pany, who will use it for ballast.



Fuller, Warren & Co.'s Stove Works, Troy,  
were to have resumed operations last Monday.

#### NEW JERSEY.

A placard is posted in the New Jersey Steel  
and Iron Works, Trenton, announcing that on  
and after December 1 a reduction of wages will  
take place. Laborers are to receive 90 cents  
per day.

It is reported that the Central Railroad work-  
shops, at Hampton Junction, are to be closed.  
The Laffin & Rand Powder Co.'s Works, at  
Rifton, in Ulster county, have received an order  
from Russia for 38,000 pounds of gunpowder.

#### PENNSYLVANIA.

Partial resumption of work in the shops of  
the Philadelphia and Reading Railroad Com-  
pany, Reading, began on Monday last, and it is  
expected that in the course of a week or two  
nearly all the apprentices and about one-third  
of the journeymen will be at work again.  
There are about a dozen locomotives awaiting  
repairs, and it is thought that as these go out  
of the shop others will be brought in to be  
overhauled.

A Fern Dale car wheel firm are to send a  
representative to Brazil about January 1st, to  
look up trade.

Mr. William Downing, fire brick manu-  
facturer, Allentown, has received an order for  
200,000 bricks, from a company building a fur-  
nace near Harrisburgh.

The Altoona Car Works have secured the  
contract from the Union Line Transportation  
Company to overhaul and repaint 1300 of the  
company's cars.

The Nimson Steam Forge and Axle Works,  
Allentown, were to start on Monday last.

The Altoona shops are to construct a num-  
ber of locomotives for the Pennsylvania Rail-  
road, to commence in January.

The steel department of the Cambria Iron  
Works, Johnstown, made 1706 190-2340 tons of  
ingot steel during the week ending November  
18. The largest 24 hours' work was made on  
the 17th, amounting to 68 heats, of which 36  
were made in 12 hours.

The nail factory of the Elina Iron Works,  
Newcastle, is still running 12 hours a day.

The rolling mill of Reis, Brown & Berger,  
Newcastle, still remains idle, with no prospect  
of speedy resumption.

The Beaver Falls Cutlery Works, which have  
only been running eight hours a day for some  
time, are now working 10 hours, which is a good  
indication that business is improving.

The brick work of the new brick extension  
to the works of Seyfert, McManus & Co.,  
Reading, is nearly completed and ready for the  
roof.

Roland, Francis & Co., machinists, of Read-  
ing, had recently sent to them among a lot of  
old iron from Olney, a wood stove, which is  
probably 125 years old. A plate on the stove  
bears the date of 1748, with an inscription in  
German, above which was a well. The inscrip-  
tion reads: "God supplies the well," and is in  
old text. The stove, it is thought, came origi-  
nally from across the ocean.

An exchange says: We are authoritatively  
informed that the Bechtelsville Iron Company  
will put their new furnace into blast at an early  
day. Arrangements are being made to that  
effect. Fire has been kept in the furnace for  
the last few days. If this design is carried out  
it will be gratifying news to Bechtelsville and  
all who are in sympathy with the company.  
The furnace will not be offered at sale on the  
9th inst.

No. 1 Valley Furnace, Sharon, is making 30  
tons a day of Bessemer pig. No. 2 is all ready  
for the lining.

The Keel Ridge Furnace, Sharon, made 252  
tons of gray iron the last week of November.  
It is proposed to utilize the waste gas by bring-  
ing it to the steam boilers at the rolling mill.

At Sharpville, Spearman Furnace No. 1 is in  
blast.

The Welmer Machine Works, Lebanon, have  
contracted with Messrs. Ward & Guernard, of  
Cartersville, Ga., for one of Mr. Welmer's Cen-  
tennial blowing engines, of the same class as  
that furnished Mr. Grubb for his Mt. Hope Fur-  
nace. The necessary boilers to supply the engine  
with steam are also included in the contract.  
The second week of the run of the Mt. Hope  
Furnace was 56 tons of No. 1 iron, nearly dou-  
ble the product of the furnace before remodel-  
ing by Mr. Welmer.

Evans Dampman, of near Barnestown, West  
Nantmeal, Chester county, has sunk a shaft on  
his farm in East Nantmeal to the depth of 33  
feet, and at that depth has gone through 25 feet  
of iron ore.

Wallace & Sons, of Wormelsdorf, are run-  
ning their plow factory on full time, and are  
turning out a large number of plows weekly.

Marietta's new hollow-ware works will soon  
start, employing at least 60 persons, and a new  
furnace is expected to be started.

The Cambria Iron Company, Johnstown,  
have just purchased the right to use Diehl's  
smoke consumer, and will at once put it in  
operation at their extensive works in that place.  
It is expected to save from \$10,000 to \$15,000  
per year in the matter of fuel.

The Reading Railroad Company have pur-  
chased the Port Carbon Rolling Mill and Fur-  
nace, late the property of the Schuylkill Iron  
Company, for \$5000, at Sheriff's sale.

The Warwick Iron Company is now engaged  
in sinking the shaft at the company's mines, at  
Boyertown, Berks county, 6 feet deeper than  
before, for the purpose of having a receptacle  
for the water running from the drift while be-  
ing pumped out. This will make this shaft 510  
feet in depth. There are 24 hands employed in  
this mine, working in three gangs, eight hours  
each, who raise to the surface every day from  
30 to 50 tons of ore, which is said to be the best  
quality of ore in that section.

The Lehigh Zinc Company, at South Bethle-  
hem, stopped work at their mines a short time  
since, and are now getting ores from the New  
Jersey Zinc Company (Sussex county, N. J.)  
at the rate of 12,000 tons per annum, on a con-  
tract which extends seven years from last  
autumn. The magnificent pumps of the com-  
pany at the Fredensville mines have been im-  
mersed for the present by the flow of water,  
and the surface machinery has been stopped in  
the best state of preservation. These two  
powerful companies—the New Jersey and the  
Lehigh—found it would be best for the inter-  
ests of both that the New Jersey Zinc Com-  
pany should mine the ore and the Lehigh Zinc  
Company manufacture it. According to the  
compact, the New Jersey Company cannot  
make any oxides for the American market,  
leaving the whole business in the hands of the  
Lehigh Company.

#### PITTSBURGH AND VICINITY.

The Dunbar Furnace Company are putting in  
place the large Robinson, Rea & Co.'s blowing  
engine, and the work in and around the furnace  
is being pushed rapidly forward. When fin-  
ished, this will be one of the most complete  
furnaces in this country.

Messrs. Jones & Laughlins are about to  
put the Coyne nail picker on their nail ma-  
chines.

Zug & Co. started their new nail factory on  
the 28th of last month.

Messrs. Gardner Bros. and Gardner, Stuart &  
Co., of Pittsburgh, are separate firms, although  
the fact that they are in the same line of busi-  
ness and occupy the office in the same  
building in Pittsburgh sometimes leads to mis-  
takes. Gardner Bros. are the proprietors of  
the Clay Retort, Fire Brick and Tile Works  
at Lockport, Westmoreland county, Pa., and  
have done a heavy business in retorts for gas  
works and other manufacturing establishments;  
gas retorts being a specialty. The firm of  
Gardner, Stuart & Co., proprietors of the  
Cumberland Fire Brick Works, manufacture  
the "Standard Savage" fire-brick, tile and  
furnace blocks. Mr. Gardner of the first men-  
tioned firm is also a member of the last, and  
the office of both firms is at 96 1/2 Fourth avenue,  
Pittsburgh.

#### WEST VIRGINIA.

Industrial affairs at Wheeling are said by an  
exchange to stand as follows: During the  
month of December the nail mills will be run-  
ning on about half time. The LaBelle will not  
run this week, but will probably run for a short  
season before Christmas. The Riverside will  
run her small factory only. The bar and nail  
mill belonging to this establishment, owing to  
a number of orders in hand, will run steadily  
until January. The Riverside Blast Furnace,  
which is now out for repairs, will be completed  
by about the middle of December, and will  
probably be blown in early in January. The  
Top Mill expects to run about half time until  
January, and then, like all the rest, its opera-



tions will depend upon the condition of trade. The Benwood Mill is rapidly approaching completion. It will be in running order about the 15th of December, and will be started up at that time.

The Strange Creek Iron Co., with a capital of \$40,000, and \$35,000 paid in, have been incorporated. The object is the manufacture of pig iron. Principal office, Strange Creek, Braxton county. The largest shareholder is Marshal F. Frame.

The Riverside Mill is furnishing iron for the Bellaire and St. Clairsville narrow gauge railroad.

One of the Hardman furnaces in Preston county, known as the Glades Furnace, was sold Friday last to a Mr. Evans, of Philadelphia, for \$12,500.

Large quantities of West Virginia iron ore are being shipped from Huntington to Wheeling.

## OHIO.

State Mine Inspector Roy estimates that the coal production of Ohio for 1876 will hardly reach 3,000,000 tons. The production in 1875 was 4,800,000 tons. None but the very best of mines in the State are running on full time, others on half time, and another class from four to five days per month.

The two Himrod furnaces now running are making about 100 tons per day, being a larger average of production than they ever made before.

Messrs. Diets, Harris & Morrison, of Ashtabula, and Mr. Cornell, of Youngstown, have undertaken the management of the Ashtabula Rolling Mill.

The Union and Aetna mills of the Union Iron Works Company, Cleveland, are running irregularly, half time, full, and occasionally overtime. They will probably average full time.

The Lake Shore rail mills, of the Cleveland Rolling Mill Company, have shut down for want of orders. This is somewhat unexpected as they have been running on full time since January 1st, and the 1st of the present month were turning out about 85 tons finished iron rails per day.

The manufacture of Watson's patent portable forge and blower, in which the Cleveland Steam Gauge Company have lately embarked, seems to be a success. Twelve forges per week are manufactured, and the company are three weeks behind with their orders, and orders booked to last until January 1st.—*Trade Review*.

Messrs. Homer, Hamilton & Co., machinists and foundrymen, Youngstown, are making a mammoth hoisting tower for the Tuscarawas Iron and Coal Company, of Canal Dover. It will be of iron, 90 feet high.

Brown, Bonnell & Co.'s two furnaces, Youngstown, are in full blast, running on iron for their own mills. Their rolling mills are running on full time. They ship 8 car loads of finished iron daily. Their nail mill is running on 12 hours time. Orders in excess of supply.—*Vindicator*, 24th.

The Portsmouth stove makers are busy. The Ohio Stove Company have all the orders they can fill. H. Eberhardt & Co. are turning out stoves of all kinds, and shipping largely.

## TENNESSEE.

Messrs. Cahill & Whiteside, Chattanooga, have an addition to their foundry about completed which will nearly double its capacity. The rush of work has necessitated this extension.

## ILLINOIS.

The North Chicago Rolling Mills have made contracts with different railroad corporations to manufacture large quantities of iron and steel equipments, to be delivered next year; so that the works will be run during the winter. Among the orders received is one from the Pittsburgh, Fort Wayne and Chicago Railroad for 4000 tons of steel rails.

## KENTUCKY.

The Norton Iron Works, Ashland, are in operation. Only nails are made.

The sale of Boone Furnace, advertised for November 23d, to take place at Covington, was postponed until March 28th.

A break in the inwall of Hunnewell was discovered last week, and the furnace at once blown out. The extent of the break proved not very great, and the necessary repairs were so quickly executed that blast was put on on the 27th. When blown out she had arrived at a working condition far in excess of any of her previous excellent yields. She had been averaging 20 tons for 10 days, which is the best put out on record in the Hanging Rock region.

Clear Creek Furnace, Bath county, blew out on the 16th, after a successful four months' blast, during which she made 450 tons of excellent cold blast iron. Operations may be resumed next year, but nothing has been decided as yet.

## GEORGIA.

The new charcoal furnace of the Cherokee Iron Company, Cedartown, was completed in 1875, and has since stood idle. It will be put in blast about the 15th instant, and the company expect it will make a good showing for itself. Its capacity is 25 to 30 tons per day. It is blown by a Corliss frame engine, a cylinder 60 inches; steam cylinder, 30½ inches; stroke, 6 feet. The furnace occupies a very advantageous location. Beside having an abundant supply of timber and good ores convenient and in quantity sufficient for many years, the company have a pine tract of 600 acres of farming land under cultivation, producing wheat, corn, oats hay and vegetables sufficient to supply the wants of the company's resident employees at all seasons.

## MICHIGAN.

The Bay Furnace is in blast.

The M. and P. Rolling Mill Furnace is making 1000 tons per month.

The Munising Furnace will blow out shortly, probably for the winter.

## AMERICAN SCREW CO.,

Providence, R. I.

Manufacturers of

IMPROVED  
Gimlet Pointed Wood Screws,  
Patented

May 30,

1876.

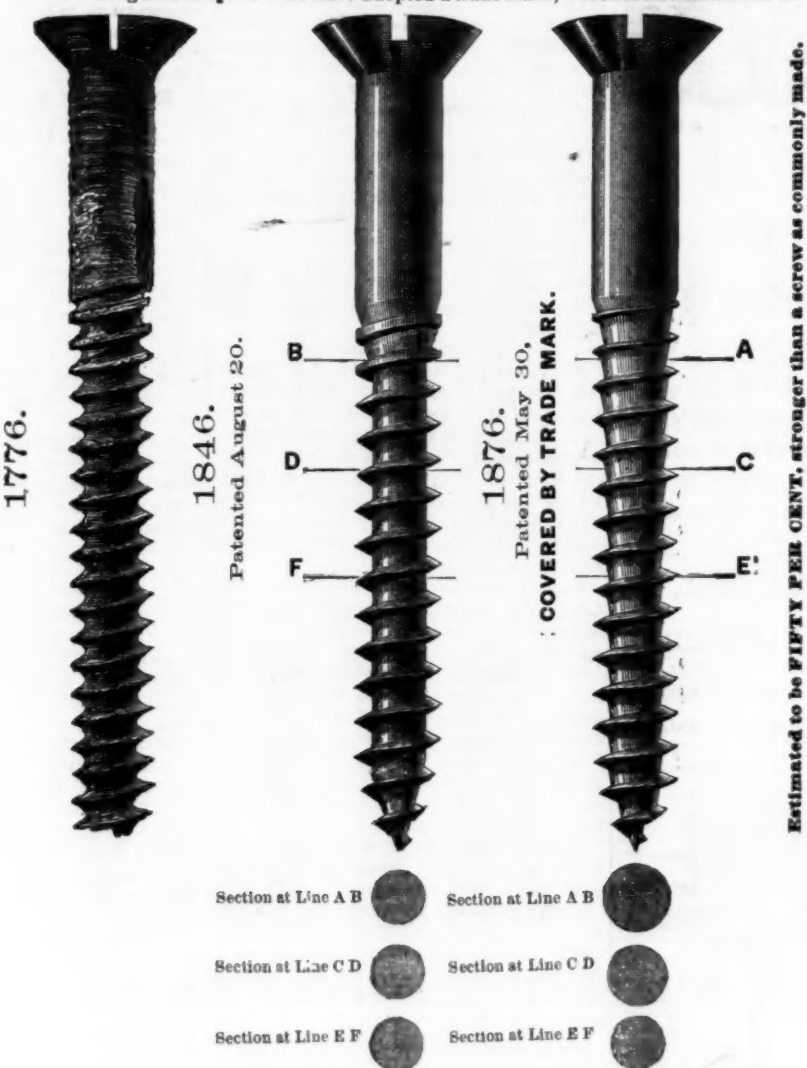


After forty years' experience we offer to the trade our Centennial Screw, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery, as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at same price as the old style screw.

The new screws will be packed in manila colored boxes with new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade mark, which is also secured to us.



Estimated to be FIFTY PER CENT. stronger than a screw as commonly made.

The above drawings show the progress of screw making from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

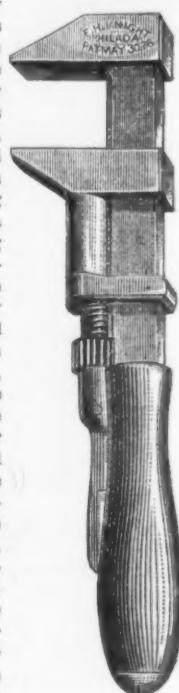
It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated above. See sections at lines.

## CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

## E. H. Knight's Improved Wrench.

The invention consists of a sliding bar carrying one of the jaws, and provided with a nut or stop, in combination with the handle, having a shoulder or stop, whereby a spring, engaging with the sliding bar, will press the jaw thereof toward the stationary jaw, so that the jaws close automatically on the nut or other article to be grasped after they have turned the corners or angles of the latter, after which the jaws will be held by a lever, which engages with the sliding bar. It also consists of a jaw, secured to a sliding bar, which is drawn inwardly by a spring, in combination with a jaw which is fitted to said bar, and provided with an adjusting screw, whereby the jaw may be adjusted relatively to the thickness of the nut or article to be grasped, and the sliding bar will be engaged by the controlling lever always at the same shoulder or notch, regardless of the thickness of the nut or article. The handle may be formed of one piece or in sections, and its inner or upper end will be firmly connected to the stirrup or an attachment thereof.



The operation is as follows: The screw will be rotated so as to move the jaw, and adjust the space between the two jaws relatively to the dimensions of the nut, bolt-head or other article to be engaged and turned in a manner similar to a wrench of ordinary construction. The operator then grasps the handle and lever, so as to cause the lug to engage with the shoulder of the tang, whereby the tang, and consequently the bar, will have no sliding motion, the jaw being thereby controlled. Then the wrench will be operated as an ordinary wrench. When the turn has been made the operator lets go the lever, whereby the tang is released and the jaw is no longer controlled, the spring forcing the lug from the shoulder of the tang. The wrench is then returned to its first position without previously removing the jaw from the nut or other article, as is usual in an ordinary wrench. When the jaws in the returning motion of the wrench reach the corners or angles of the article, they are not stopped thereby, for the spring will be overcome, and thus the jaw yields, so as to increase the space between the jaws, and the latter ride freely over the said corners or angles of the article, so as to assume positions on the next face of which they are to take hold. The spring now draws the jaw to its first adjusted or normal position. Then the operator grasps the handle and lever, whereby the lug and shoulder engages, and thus the jaw is again controlled, the tang of the bar being immovably held in the handle. Another turn of the wrench on the article may then be made, and the operation, being similar to that stated, will be continued until finished, it being noticed that in turning the nut or other article after a turn is made the wrench will not be removed from the article to take a fresh hold thereon. The manufacturer claims the following as new: "The sliding bar carrying the jaw, and provided with the nut or stop, in combination with the handle, having shoulder or stop, the inwardly-pressing spring, and controlling lever. The jaw, secured to the sliding bar, which is drawn inwardly by the spring, in combination with the jaw fitted to said bar, and provided with the adjusting screw."

The above invention was patented in May, 1876, and the wrenches are now being manufactured and offered for sale by (the patentee) Mr. E. H. Knight, 1232 Chestnut street, Philadelphia.

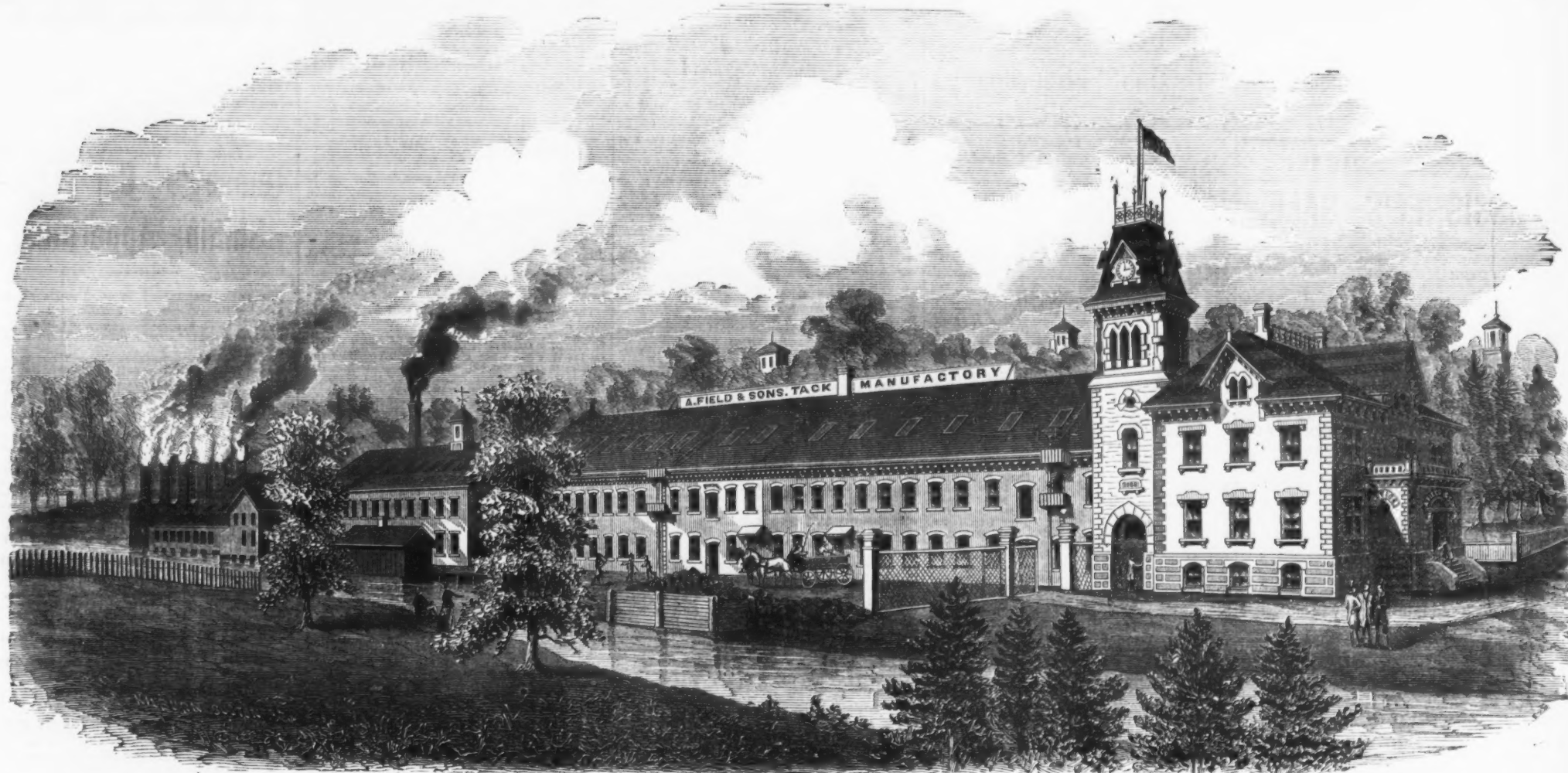
**Transfer of Canadian Merchandise in Bond.**—The British minister has again called the attention of our government to the existing treasury regulations adopted in April, 1875, in relation to the transit of goods from Canada over our territory as not being in harmony with the Treaty of Washington. The particular ground of objection is that goods from Canada destined for transit through this country and exportation at seaboard ports, are not allowed to make the journey to the seaboard in cars sealed by the United States Consul in Canada, so as to avoid unloading and inspection at frontier ports of first arrival, although goods from Canada intended for consumption are allowed such privilege. After a careful consideration of this subject the Secretary of the Treasury has decided that, under the treaty, transit goods are entitled to the same privileges of transportation, under the consular seal act of 1864, as other goods coming from Canada; they can proceed to the designated ports on the seaboard by continuous route, and that the discrimination heretofore practiced against transit goods will be discontinued. The Secretary has accordingly rescinded the regulations of recent date and restored those in force from the year 1864.

English iron manufacturers are complaining that American competitors are putting axle frames and pulleys into the Staffordshire market, and then they have already taken away the business of Birmingham manufacturers in Canada. This is not the worst of it, either.

The variety of new explosive compounds, with new and strange names, which almost weekly claim attention, is curious. In addition to Tonite we have now Liqueur, made of wood fiber and nitro-glycerine, and Pantopolit, a kind of dynamite with naphthalene.



ESTABLISHED 1827.



ENTIRE LENGTH OF WORKS 700 FEET.

# A. FIELD & SONS

## TAUNTON, MASS.

Manufacturers of

IRON  
COPPER  
TINNED  
SWEDES IRON  
UPHOLSTERERS'  
CARD CLOTHING  
PAIL AND TUB  
GIMP  
LACE  
PATENT COPPER PLATED  
LARGE HEAD CARPET

FINISHING  
TRUNK  
CLOUT  
CHAIR  
CIGAR BOX  
HUNGARIAN  
HOB  
SILVERED OR JAPANNED LINING  
SILVERED OR JAPANNED SADDLE  
TUFTING  
COPPER CUT

# TACKS

# NAILS

BRADS AND PATENT BRADS.

LEATHERED CARPET  
TINNED CARPET  
COLORED COATED CARPET  
COFFIN LINING  
MINERS'  
BRUSH  
LOOKING GLASS  
SHOE OR LASTING  
ROUND HEAD  
ROOFING  
EVERY STYLE OF

BOAT REGULAR  
BOAT CHISEL POINTED  
FINE TWO PENNY  
FINE THREE PENNY  
PATENT COPPER PLATED  
CHANNEL  
AMERICAN IRON SHOE  
SWEDES IRON SHOE  
ZINC SHOE  
STEEL SHOE  
CHARCOAL IRON SHOE

With New, Improved, and Patented Machinery, we shall now make

## GLAZIERS' POINTS,

ONE OF OUR SPECIALTIES.

Any variation from the regular size or shape of the above named goods made from samples to order.

QUALITY GUARANTEED TO BE SATISFACTORY.

OFFICES AND FACTORIES. - - - - - TAUNTON, MASS.

Warehouse and Salesroom at 78 Chambers Street, New York.







# Trade Report.

Office of THE IRON AGE.

WEDNESDAY EVENING, Dec. 6, 1876.

The financial markets have been generally devoid of interest during the past week, and no healthy activity is expected until the uncertainty respecting the issue of the national canvass is set at rest. The President's message is to so great an extent a negative document that it has had no influence on "the street." The accompanying public documents have attracted but little attention, although Mr. Secretary Morrill's report is generally regarded as a sensible document, expressing sound financial views.

The local money market has stiffened somewhat, owing to the continued drafts of the West and South for currency to move the pork and cotton crops. Rates to borrowers on call have advanced to 5 @ 7 per cent.

In the gold market 108 3/4 and 109 have been the limits of the premium fluctuation. The market is otherwise without feature of general interest. We give below the highest and lowest daily quotations in this market:

	Highest.	Lowest.
Thursday.....	109	108 3/4
Friday.....	109	108 3/4
Saturday.....	108 3/4	108 3/4
Monday.....	108 3/4	108 3/4
Tuesday.....	108 3/4	108 3/4
Wednesday.....	108 3/4	108

In the bond market governments have shown a tendency to strengthen, which is gratifying as indicating an abiding popular faith in the stability of our national credit and a belief that our present political troubles will reach a peaceful and satisfactory settlement, which the country will loyally accept; and that whichever of the two aspirants is inaugurated will be supported by the people until he shall have forfeited their confidence. If any real danger menaced the country, or if there were any substantial basis for the sensational predictions of the political newspaper press, the most sensitive barometer of the situation would be found in the government bond market. We give below the quotations of U. S. securities at the close of business to-day. State bonds have been dull; railway mortgages are irregular and weak.

The stock market has been heavy, and the tendency of prices has been downward. The principal speculative dealings have been in Lake Shore, D. L. & W., Western Union, St. Paul, New Jersey Central and Michigan Central. We give below the quotations of active shares at the close of business to-day.

The bank statement shows a reduction of \$3,356,700 in legal tenders, from the cause already noted. In other respects the changes are unimportant, as will be seen from a comparison of the aggregate averages for two weeks:

	Nov. 25.	Dec. 2.	Differences.
Loans.....	\$327,457,700	\$326,560,700	Dec. \$896,000
Specie.....	20,084,500	20,484,100	Inc. 399,600
Legal tenders.....	42,210,400	39,823,700	Dec. 2,386,700
Deposits.....	209,332,400	207,322,000	Dec. 2,010,400
Circulation.....	15,013,300	14,833,500	Dec. 179,800

The foreign trade movements for the week are shown in the following tables:

Imports.			
	1874.	1875.	1876.
Total for week.....	\$5,517,736	\$5,447,136	\$5,409,347
Prev. reported.....	\$59,628,792	\$59,007,116	\$59,409,347

Since Jan. 1.....\$363,146,528 \$306,454,212 \$261,810,688

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils.....	130	\$1,162
Brass goods.....	14	2,380
Bronzes.....	43	8,401
Chains and anchors.....	55	2,331
Copper.....	11,743	1,133
Cutlery.....	1	939
Gas fixtures.....	149	9,966
Gun.....	5	357
Hardware.....	5	15,083
Iron, pig, tons.....	9	995
Iron, sheet, tons.....	197	577
Iron cotton ties.....	58	1,317
Lead, pigs.....	1,272	7,772
Metal goods.....	5	924
Nails.....	22	10,077
Needles.....	1,270	2,629
Old metal.....	21	1,880
Per. caps.....	1,949	18,633
Saddlery.....	19,461	98,752
Steel.....	249	9,471
Tin boxes.....		
Wire.....		

For the week ended Dec. 5:

	1874.	1875.	1876.
Total for week.....	\$4,101,914	\$5,190,901	\$6,544,616
Prev. reported.....	\$65,214,046	\$63,779,451	\$64,636,508

Since Jan. 1.....\$369,321,960 \$335,910,932 \$254,591,124

For the week ended Dec. 2:

	1874.	1875.	1876.
Total for week.....	\$3,960,110	\$4,337,213	\$4,537,223
Previously reported.....	\$3,960,110	\$4,337,213	\$4,537,223

Same time in 1874.....\$4,537,223

Same time in 1875.....\$4,537,223

Same time in 1876.....\$4,537,223

Government bonds close as follows:

	Bid.	Asked.
U. S. Currency 6s.....	112 1/2	113 1/2
U. S. 6s 1861, reg.....	112 1/2	113 1/2
U. S. 6s 1861, con.....	112 1/2	113 1/2
U. S. 6s 1865, reg.....	109 1/2	110 1/2
U. S. 6s 1865, con.....	109 1/2	110 1/2
U. S. 6s 1865, new reg.....	109 1/2	110 1/2
U. S. 6s 1865, con.....	112 1/2	113 1/2
U. S. 6s 1867, reg.....	112 1/2	113 1/2
U. S. 6s 1867, con.....	112 1/2	113 1/2
U. S. 6s 1868, reg.....	112 1/2	113 1/2
U. S. 6s 1868, con.....	112 1/2	113 1/2
U. S. 10-40 reg.....	112 1/2	113 1/2
U. S. 10-40 con.....	111 1/2	112 1/2
U. S. 5s 1861, con.....	111 1/2	112 1/2
U. S. 4 1/2 per cent.....	109 1/2	110 1/2

The following were the closing quotations of active shares:

	Bid.	Asked.
Atlantic and Pacific Telegraph.....	15	15 1/2
Chicago & Northwestern.....	59 1/2	60 1/2
Chicago, Rock Island and Pacific.....	99 1/2	100 1/2
Chic. & Ind. Cent.....	113	114 1/2
Col. Chic. & Ind. Cent.....	3 1/2	3 3/4
Col. Chic. & Ind. Cent.....	3 1/2	3 3/4
Cleveland and Pittsburgh.....	88 1/2	89 1/2
Chicago & Alton.....	99 1/2	100 1/2
Consolidation Coal.....	32	33
Canton.....	30	31
Del., Lack. and Western.....	70 1/2	71 1/2
Delaware & Hudson Canal.....	69 1/2	70 1/2
Adams Express.....	60 1/2	61 1/2
American Express.....	60 1/2	61 1/2
United States Express.....	55 1/2	56 1/2
Wells, Fargo & Co. Express.....	89	90
Harlem.....	94	95
Hartford.....	138	139
Hannibal & St. Joseph.....	13 1/2	14 1/2
Illinois Central.....	65 1/2	66 1/2
Kansas Pacific.....	8 1/2	9 1/2
Kansas & Texas.....	7 1/2	8 1/2
Lake Shore.....	55 1/2	56 1/2
Michigan Central.....	43	44 1/2

Morris & Essex.....	92	93 1/2
Milwaukee & St. Paul.....	19 1/2	20 1/2
Mariposa.....	5 1/2	5 3/4
New York Central.....	101 1/2	102 1/2
New Jersey Central.....	33 1/2	34 1/2
Ohio & Mississippi.....	5 1/2	5 3/4
Pacific Mail.....	24 1/2	25 1/2
Panama.....	127	128 1/2
Pittsburgh & Port Wayne.....	101	102 1/2
Pacific of Missouri.....	3	3 1/2
Quicksilver.....	13	14 1/2
St. L., Kan. City Northern.....	18	19 1/2
Tol., Wabash & Western.....	26 1/2	27 1/2
Union Pacific.....	58	59 1/2
Western Union Telegraph.....	72	73 1/2

## GENERAL HARDWARE.

The demand for domestic hardware of every description continues dull. Very few travelers are out, and letter orders, as is usual so near the close of the year, are limited to the actual necessities of the moment. In Foreign Hardware the same conditions exist.

The demand for Nails is light, and prices continue firm at previous figures, viz., 10d. to 60d., \$3 per keg, net; orders of 100 kegs and over are subject to a discount of 10 cents per keg.

Darling, Brown & Sharpe, Providence, R. I., illustrate in their advertisement on the 9th page their English Standard Wire Gauges. They quote these goods at discount 25 per cent. from their list, which will be mailed on application.

From the following circular it will be seen that the Biddle Hardware Company quote American Screw Co.'s Flat Head Iron Wood Screws at discount 60 per cent. The price for these goods in this market continues firm at unchanged figures.

Office of the BIDDLE HARDWARE CO.—PHILADELPHIA AGENTS FOR AMERICAN SCREW CO.'S SCREWS.  
We solicit orders for the above make of Screws at the following prices, subject to change without notice.  
Prices not guaranteed. Terms net cash 30 days.

Flat Head Iron Wood Screws.....	dis. 60 %
Round Head Iron ".....	dis. 52 %
Round Head Iron ".....	dis. 40 %

All orders will be promptly filled to the extent of our stock, and the balance cancelled. Respectfully, BIDDLE HARDWARE CO. PHILADELPHIA, 11th month, 13th, 1876.

The Union Nut Co., 99 Chambers street, have added to their specialties Perry's Improved Meat Cutters and Sausage Fillers; Store and Barrel Trucks, Garden Barrows and Clark's Patent Wagon Jacks, all of which they offer to the trade at the manufacturer's best terms. We print below the list for Perry's Improved Meat Cutters and Sausage Fillers. The list for Meat Cutters is subject to discount 40 per cent., and Sausage Fillers 30 per cent. discount to the trade:

Perry's Improved Meat Cutters.	
No. 1, Family.....	each, \$3.00
No. 2, Hotel.....	" 5.00
No. 3, Hotel.....	" 11.00
No. 4, Butcher's.....	" 13.00
No. 5, ".....	" 30.00

Sausage Fillers.

No. 11.....	per doz., \$15.00
No. 10.....	" 21.00

N. B. Phelps, sole agent for the sale of the "Climax" and "XXX Universal" Purchase Gear Clothes Wringers, has issued the following circular:

102 CHAMBERS STREET, N. Y., Nov. 28, 1876.  
Herewith please find reduced price list of the "Climax" and "XXX Universal" Clothes Wringers, the sale of which I have arranged for the exclusive agency.

The sale of Wringers with Purchase Gears is rapidly increasing; the saving of half the labor in operating a machine is a great consideration, especially with feeble women who are obliged to do their own washing and wringing. Notwithstanding that these Wringers are much more expensive to manufacture, the price to the trade, when cash is received before the goods are shipped, is but 25 cents more than that of common cog-wheel Wringers.

With 13 years' experience in the business, and ample means, I hope to be able to maintain for these Wringers the high standard they have already obtained; for, I assure you, I shall seize upon every opportunity to improve them in every manner possible.

Fair and honorable dealing, I trust you will allow me to say, has been my policy in the past, and upon that basis I respectfully solicit a continuance of your favors, which have heretofore been so liberally extended to me.

Respectfully, N. B. PHELPS.

The price list referred to in the above circular is as follows. These Wringers will be supplied to the retail trade only.

"Climax" and "XXX Universal" Purchase Gear Clothes Wringers.

	Size of Cloth.	Retail.	Wholesale.
	Length.	Diam.	Price each.
No. 2.....	10 in.	1 1/2 in.	\$8.00
No. 1 1/2.....	11 in.	1 1/2 in.	9.00
No. 1.....	11 in.	2 1/2 in.	10.00
No. 5.....	12 in.	1 1/2 in.	10.00
No. 6.....	12 in.	2 1/2 in.	12.00
No. 7.....	12 in.	2 1/2 in.	15.00

A reduction at the rate of \$2 per dozen will be allowed when cash is received before the goods are shipped.

The Hart, Bliven & Mead Mfg. Co. have added to their assortment of Ornamental Hardware a large line of Flower Pot or Druggists' Brackets, made of Iron, Ornamental and Matted Work, finished in Verd Antique and Enamelled and Gilt. They have 1, 2, and 4 dishes for holding the flower pots, both single and double arms. It is claimed by the manufacturers that this is the finest line of these goods ever offered to the trade. The following is the list, which is subject to discount 50 per cent.:

Flower Pot or Druggists' Brackets.	
	Per doz.
No. 10, Verd Antique; Length of Arm, 6 in.; Diameter of Dish, 5 1/2 in. ....	\$5.75
No. 15, Enamelled and gilt; Length of Arm, 6 in.; Diameter of Dish, 5 1/2 in. ....	7.50
No. 20, Verd Antique; Length of Arm, 6 in.; Diameter of Dish, 5 1/2 in. ....	8.00
No. 25, Gilt; Length of Arm, 6 in.; Diameter of Dish, 5 1/2 in. ....	10.00
No. 30, Verd Antique; Length of Arm, 10 in.; Diameter of Dish, 6 in. ....	10.50
No. 35, Enamelled and Gilt; Length of Arm, 10 in.; Diameter of Dish, 6 in. ....	12.50
No. 40, Verd Antique; Length of Arm, 12 in.; Diameter of Dish, 6 in. ....	13.50

No. 45, Enamelled and Gilt; Length of Arm, 12 in.; Diameter of Dish, 6 in. ....	15.50
No. 50, Verd Antique; Length of Arm, 14 in.; one 5 1/2 inch and one 6 inch Dish. ....	16.00
No. 55, Enamelled and Gilt; Length of Arm, 14 in.; one 5 1/2 inch and one 6 inch Dish. ....	20.00
No. 60, Verd Antique; Length of Arms, 8 inches; Diameter of Dishes, 5 1/2 inches. ....	14.50
No. 65, Enamelled and Gilt; Length of Arms, 8 inches; Diameter of Dishes, 5 1/2 inches. ....	16.50
No. 70, Verd Antique; Length of Arms, 10 inches; Diameter of Dishes, 6 inches. ....	20.50
No. 75, Enamelled and Gilt; Length of Arms, 10 inches; Diameter of Dishes, 6 inches. ....	22.50
No. 80, Verd Antique; Length of Arms, 14 inches; two 5 1/2 inch and two 6 inch Dishes. ....	30.00
No. 85, Enamelled and Gilt; Length of Arms, 14 inches; two 5 1/2 inch and two 6 inch Dishes. ....	34.00

We print below a list of seasonable goods manufactured by the Iron Clad Can Co., of Greenpoint avenue, Brooklyn, E. D. Their Iron Clad Fire Shovel is illustrated in their advertisement on the 40th page. This Shovel has a round handle, and is made from one piece of metal, both handle and pan:

PRICE LIST OF COAL RODS, FIRE SHOVELS, ASH CANS AND FRY PANS MANUFACTURED BY IRON CLAD CAN CO.

The Iron Clad Fire Shovel.	
Per gross.	Per gross.
Japanned.....	\$15.00
Galvanized.....	21.00
Discount 40 per cent.	

Centrifugal Ash Sifter.	
Japanned.	Each.
No. 1, 12x14.....	\$2.00
No. 2, 13x17.....	2.50

Galvanized.	
No. 1, 12x14.....	Each.
No. 2, 13x17.....	3.00

Discount 25 per cent.	
Lapped Fry Pans.	Polished.
No. 1, 8 1/2 in. diam.....	\$3.75
No. 2, 9 ".....	4.25
No. 3, 9 1/2 ".....	4.75

The Iron Clad Coal Rod.	
Japanned.	Per doz.
15 in. ....	\$4.50
16 ".....	4.75

Galvanized.	
15 in. ....	Per doz.
16 ".....	5.00

Discount 30 per cent.	
Funnel Coal Rods.	Per doz.
No. 15.....	\$8.00
No. 16.....	8.50

Discount 10 per cent.	
Japanned.	Per doz.
No. 15.....	\$8.00
No. 16.....	8.50

Galvanized.	
No. 15.....	Per doz.
No. 16.....	9.00

Discount 10 per cent.	
Ash Cans.	Japanned.
No. ....	Diameter.
1.....	13 in.
2.....	14 ".....
3.....	15 ".....
4.....	16 ".....
5.....	18 ".....
6.....	20 ".....

With Wood Stalls.	
No. ....	Diameter.
7.....	15 ".....
8.....	17 ".....
9.....	18 ".....
10.....	20 ".....

Galvanized.	
No. ....	Diameter.
1.....	13 in.
2.....	14 ".....
3.....	15 ".....
4.....	16 ".....
5.....	18 ".....
6.....	20 ".....

With Wood Stalls.	
No. ....	Diameter.
7.....	15 ".....
8.....	17 ".....
9.....	18 ".....
10.....	20 ".....

Covers.	
No. ....	Diameter.
1.....	13 in.
2.....	14 ".....
3.....	15 ".....
4.....	16 ".....
5.....	18 ".....
6.....	20 ".....

Discount 40 per cent.	
No. ....	Diameter.
7.....	15 ".....
8.....	17 ".....
9.....	18 ".....
10.....	20 ".....

The above are manufactured with the patent Wrought Iron Bottom, and corrugated wrought iron hoop around the top. All specialties made to order. Customers in ordering need mention number only, and state whether to be Galvanized or Japanned.

Graham & Haines have been appointed sole agents for the sale of Dodge's Kentucky Cow Bells, manufactured by T. P. Barclay, Louisville, Ky. They will deliver these goods either from stock or factory at the manufacturer's best terms. The following is the list for these goods, which is subject to discount 45 per cent. to regular trade. For quantity orders an extra discount is allowed:

Dodge's Kentucky Cow Bells.	
No. ....	Per doz.
No. 0.....	\$12.00
No. 1.....	13.00
No. 2.....	14.00
No. 3.....	15.00
No. 4.....	16.00
No. 5.....	17.00
No. 6.....	18.00
No. 7.....	19.00
No. 8.....	20.00
No. 9.....	21.00
No. 10.....	22.00

The maker of these Bells states that for nearly 30 years this brand has been the standard stock Bell in the country, always honestly made of best material by skilled workmen.

We invite attention to the advertisement of Mann's Metallic Sieves, on the 34th page. The manufacture of these goods, interrupted by the death of the inventor, has been permanently re-established at Chicago. Graham & Haines continue to act as agents for the goods in this market. The merits of this Sieve have made it a necessity to the house-wife and to the dealer. Clean, neat and strong, it has in a brief time supplanted, wherever offered, the wooden Sieves, which for more than a century had remained



## METALS.

**Copper.**—The market has been very quiet, there being but few buyers, and sales for the week have been confined to 100,000 pounds Lake Superior, at 20½¢, and 200,000 pounds ditto at 20¢. At the latter figure more might be had at the close. Baltimore we call 20½¢, nominally. The manufacturers who bought ahead some time ago are now receiving their Copper, and so near the close of navigation the arrivals are larger than usual. Within a week from now this Copper will be all in, the last boat, which left Nov. 25, having arrived at Detroit. Thereafter the only receipts will be by rail. No change is reported by cable from London. Best Selected remaining \$25 and Chili Bars \$27. Mail advices from the same quarter have reached us as late as Nov. 23, from which we extract the following: "Copper has suffered in consequence of the warlike aspect of Eastern affairs, to the extent of \$2, but has recovered since, prices at date being for Tough Ingots, \$24; Best Selected, \$26; and Sheets, \$21." There is but a limited demand for manufactures, which we quote 31c. for Sheathing and 32c. for Bolts and Braziers; New Yellow Metal Sheathing, 18½¢. @ 19c.; and Yellow Metal Bolts, 26c. @ 28c., net cash.

**Tin.**—The market was rather firmer here till Saturday, since when it has shown less strength; a moderate business has been transacted. We quote at the close as follows: Straits, 17½¢. @ 17½¢; English Refined, 17½¢. @ 17½¢; ditto Common, 17½¢. @ 17½¢; and Banca, 19½¢; all gold, large lines. London from \$79 for Straits has yielded to \$76 @ 17½¢. 10; the latter figure is equal to about 18½¢, gold, here. Mail advices are to hand from England to the 23d ultimo, reading as follows: "Owing mainly to the receipt of more unfavorable news from the East a decline in Straits Tin of £3 per ton occurred, half of which drop has been recovered, and the market closes with considerable buying, at Ingots (L. and F.), £23; Bars, £24; Grain Bars, £20; Granulated, £21; and Straits, £27. 10/ @ £28." **Tin Plates.**—Our own market has been dull, while in England plates have been quiet but firm after the late large business. We quote at the close as follows, gold, per box, large lots, ordinary brands: Charcoal Bright, \$6-75 @ \$7; ditto Ternes, \$6-25; Coke Tin, \$6 @ \$6-12½; and Ternes, \$5-50 @ \$5-62½. From Liverpool they write under date of 23d ultimo, as follows: "The better feeling noted last week has been maintained, and the demand has spread from Coke Tins, with which it commenced, to the other descriptions. Makers are now for the most part provided with work for this and next month, and are unwilling to book further forward, except at advances ranging from 6d. @ 1/ over the lowest point touched."

**Lead.**—There have been sold in this market during the week 500 tons Omaha and Missouri Lead, at rates laying it down here at 5-90c. and 6-15c., currency. Newark is scarce on the spot, and consumers in want of it have had to pay as high as 6-07½¢. @ 6-10c., currency. Soft at St. Louis is dull at 5½¢, currency, but selected there is firm, and sales have been made as high as 6c., currency; freight, 24c. The general market for Common Domestic looks dull; there is little demand, consumers still being sufficiently stocked, and there being due beside from California some 1100 tons ere the year comes to a close. Foreign is quiet; we quote the same nominally 6½¢, gold. Accounts by mail from England are to hand dated Nov. 23d, and read as follows: "Spanish Pig is in rather better supply; but this has had no depressing effect on the market, as even with the additional arrivals there is not more than sufficient to meet the demand for consumption. The belief obtains among both buyers and sellers that prices will further advance. Rates at date are: Spanish Pig, £21. 5/, cost, freight and insurance less 1 per cent.; English, £22. 7/6 @ £23; Sheets, £23. 10/; Piping, £24, and ditto, small, £24. 10/." Manufactured remains in moderate request at 8½¢, for Bar, 9c. for Pipe, and 9½¢, for Sheet, less the usual discount to the trade.

**Spelter and Zinc.**—Domestic Spelter, consisting of good brands, without difficulty brings 6½¢, currency, here; while common quality made from blende, and not quite as reliable for brass manufacturing, is offering at 6½¢, currency. In Foreign we have no transactions to report, and quote the same 6½¢, to 7c., gold, nominally, with a stock of 50 tons. There is nothing new from Europe. Sheet Zinc is very quiet, and we nominally quote Domestic, 7½¢. to 8½¢, currency, here, as to quantity, and Moselmann, 8½¢. to 8½¢, gold.

**Antimony.**—A slightly improved tone is noticeable, yet trade therein remains circumscribed. We quote the same 13½¢. to 14c., gold, as to quantity.

## OLD METALS, PAPER STOCK, &amp;c.

We have no perceptible change to report in the condition of the Old Metal market since last week. Business continues very dull, and prices remain nominally unchanged. The demand for Rags is steadily improving, and the past week has been an active one in some departments. Book and Paper Stock are selling slowly, but prices are firm at quoted rates. Grass Rope is in fair demand at market prices. We quote the following as the current purchasing rates:

**Old Metals.**—Copper, 14c. @ 15c. per lb.; Yellow Metal, 10c.; Brass, 8½¢. @ 9c.; Composition, heavy, 11c. @ 12c.; Lead, solid, 5c.; Tea Lead, 4c.; Zinc, 4c.; Pewter, No. 1, 12c.; do., No. 2, 3c.; Spelter, 5½¢. Wrought Iron, \$21 per ton; Light do., \$20 per ton; Stove Plate, \$19 per ton; Machinery, do., \$11 per ton; Bar Iron, \$4 per ton.

**Rags, &c.**—Canvas, Linen, 4½¢. @ 5½¢.; do. Cotton, No. 1, 5½¢.; No. 2, 2½¢.; White, No. 1, 5c.; No. 2, 4c.; Colored, do., 2c.; Mixed, Woolen, 2c. @ 3c.; Soft, do.,

5½¢.; Gunny Bagging, 1½¢.; Jute Butts, 1½¢. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3½¢.; Newspaper Stock, 2½¢.; Waste Paper and Scraps, 1½¢.; Kentucky Bale Rope, 4c.; Oakum Jute, No. 1, 4½¢. @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1½¢.; Grass Rope, 3c.

## EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending December 5, 1876:

Danish West Indies.		British Guiana.	
Quan. Value.		Nails, kegs.	10 \$60
Hdw., pkgs.	5 \$115	Hdw., cs.	26 530
Hamburg.		Havre.	
Machinery, cs.	29 2,753	Tacks, cs.	36 1,358
Hdw., pkgs.	29 1,730	Mach'y, cs.	57 4,314
Copper, cs.	58 22,960	Car sp'gs, cs.	3 204
Sad Irons, cs.	08 500	Copper, cs.	197 3,500
Revolvers, cs.	1 600	Ag. imp., cs.	19 1,673
Mf. Iron, cs.	10 279	Cuba.	
Bremen.		Ag. imp., pkgs.	15 760
Mach'y, cs.	5 444	Iron safe, cs.	1 275
Mf. Iron, pkgs.	47 1,730	Tel. matts, cs.	3 293
Cutlery, cs.	1 1,000	Nails, kegs.	5 4,371
Copper, cs.	18 4,750	Gas flat's, cs.	2 308
Ag. imp., pkgs.	15 335	Nails, cs.	10 156
Hdw., cs.	3 280	Tinware, cs.	3 120
London.		Cop. tubes, cs.	8 450
Spelter, slabs.	127 400	Railroad bars.	2,081 4,408
Mf. Iron, pkgs.	26 228	Mf. Iron, pkgs.	478 2,818
Mach'y, pkgs.	7 693	Spikes, kegs.	56 529
Pumps, pkgs.	3 340	Railroad cars.	8 500
Hardware, cs.	4 130	Mach'y, pkgs.	10,036 23,660
Ag. imp., pkgs.	7 175	Cutlery, bxs.	11 382
Liverpool.		Grindstones.	247 448
Mach'y, pkgs.	43 4,499	Car wheels.	12 72
Steel, cs.	7 560	Boiler tubes.	142 630
Revolvers, cs.	1 600	Guns, cs.	63 4,487
Ag. imp., pkgs.	20 1,800	Iron goods, cs.	7 934
Hardware, cs.	66 2,500	Hayti.	
Mf. Iron, cs.	1 177	Hdw., pkgs.	18 279
Spelter, bxs.	200 158	Mf. Iron, pkgs.	3 157
Writers, cs.	10 200	Nails, kegs.	27 188
Pumps, pkgs.	3 300	New Grenada.	
Glasgow.		Cartridges, cs.	173 5,495
Ag. imp., cs.	14 1,250	Mf. Iron, pkgs.	60 186
Mach'y, cs.	31 3,805	Cutlery, cs.	133 5,983
Mf. Iron, cs.	4 650	Ag. imp., pkgs.	33 922
British North American Colonies.		Guns, cs.	63 4,487
Mf. Iron, pkgs.	18 135	Mach'y, pkgs.	72 4,477
British West Indies.		Hdw., cs.	90 3,152
Wire, pkgs.	39 407	Nails, kegs.	30 105
Hdw., cs.	15 132	Iron goods, cs.	10 387
British Honduras.		Feniceuela.	
Mf. Iron, pkgs.	3 67	Mach'y, pkgs.	31 2,764
Nails, kegs.	20 72	Forge, cs.	1 665
British Australia.		Iron, pkgs.	671 699
Machinery, cs.	14 1,988	China.	
Ag. imp., pkgs.	15 349	Locks, pkgs.	5 270
Mf. Iron, pkgs.	8 400	Mach'y, pkgs.	1 67
Hardware, cs.	436 10,873	Brazil.	
Nails, kegs.	81 337	Nails, kegs.	55 156
		Ag. imp., pkgs.	33 201
		Iron, bxs.	20 67

## IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending December 5, 1876:

Hardware.		Moore J. B. & Co.	
Alexandre E. L.		Rod, colls.	283
Galvanized wire, colls.		Midland Nils.	
3		Bundles, 916	
Bokor Hermann & Co.		Nevins P. J. & Son.	
Mdse., pkgs., 7		Scrap, tons, 2½	
Arms, cs., 137		Steel.	
Dallett, Boulton & Co.		Brown William.	
Pumps, pcs., 7		Bundles, 89	
Chains, fatoms, 6		Cases, 9	
Anchor, 1		Colby J. L. & Co.	
Frasse P. A. & Co.		Cast wire rods, bdls.	
Mdse., pkgs., 1		158	
Holla H. B.		Haight J. Lloyd.	
Guns, cs., 3		Wire, bales, 21	
McCoy & Co.		McCoy & Co.	
Cases, 7		Bundles, 190	
Mdse., cs., 2		Naylor & Co.	
Moore's John P. Sons.		Cast axes, 12	
Cartridge cases, cs., 7		Scrap, spring, lots, 1	
Gun wads, cs., 4		Prosser Thos. & Son.	
Schovverling & Daly.		Forgings, 85	
Mdse., pkgs., 7		Salsbacher, Hyman &	
Squires H. C.		Wolfe.	
Guns, cs., 2		Packages, 32	
Uhlman S.		Bars, 321	
Metal ware, cs., 5		Woodford W. O.	
Wilson J. W. & Co.		Cases, 10	
Cases, 2		Order.	
Ward Aline.		Bundles, 29	
Mdse., pkgs., 8		Cast tires, 4	
Wiesbusch & Hilger Hdw.		Wire rods, bdls., 275	
Co.		Rods, bdls., 45	
Iron.		Metals.	
Congreve C. & Co.		Drexel, Morgan & Co.	
Rods, bdls., 47		Lead, pigs, 1875	
Dallett, Boulton & Co.		Naylor & Co.	
Tubs, 105		Tin plates, bxs., 398	
Grinnell, Minton & Co.		Stephan A. & Co.	
Scrap, railway, tons, 183		Tin, cs., 3	
Henry A. T.		Tin slabs, 1708	
Pig, tons, 133		Antimony, cs., 25	
Henderson Bros.		Tin plates, bxs., 107	
Pig, tons, 100		Tin ingots, 589	
		Without Bill of Lading.	
		Tin plates, bxs., 158	

## COAL.

The state of the market may be expressed in a very few words. The demand for Coal is small but steady. A large number of wholesale dealers say that there is a fair trade at the present quoted prices. Concessions are, however, easily obtained, though not large. The prices are so low that only a small margin remains. We hear of cargoes of Coal seeking a market, and Coal offered in lots here and there. The cases are not sufficiently numerous to indicate a great surplus, but they show that the market is somewhat weak.

The reduction of tonnage, which has been so much talked of, is but lightly felt as yet. Stoppages have not taken place as yet to any considerable extent, and the tonnages are not greatly affected, production being made just about equal to the demand in most instances. Seward's Coal Trade Journal says, in commenting upon the reduction of retail prices made by some of the companies: "Retail trade has had another knock down in this city, through the action of the Pittston and Lackawanna Coal companies; the former now only charges \$4-20 in the yard for Stove size, and \$3-90 for the other sizes, while the Lackawanna Coals are offered at a reduction from the previous price lists for this quality of Coal."

We continue our quotations of prices, as there are no open changes in them, all concessions being kept private:

PRICES FOR DECEMBER.		Lamp.	
		Steamer.	Broken.
		Egg.	Stove.
		Chestnut.	
PENNSYLVANIA COAL CO., at New York, 65 cents per ton additional.			
Pittston	3 00	3 00	3 10
	3 00	3 00	3 10
	3 00	3 00	3 10

DELAWARE AND HUDSON CANAL CO., at Weehawken, N. J.

Lackawanna	3 00	3 00	3 00	3 15	3 75
LEHIGH AND WILKES-BARRE COAL CO., f.o.b. at Port Johnson, N. J.					
Old Company's Summit	3 75	3 25	3 25	3 75	3 25
Honey-Brook Lehigh	3 75	3 25	3 25	3 75	3 25
Wilkes-Barre	3 00	3 00	3 00	3 00	3 25
Plymouth Red Ash	3 00	3 00	3 00	3 00	3 25

DELAWARE, LACKAWANNA AND WESTERN, at Hoboken, N. J.

Scranton	3 77	2 60	3 67	3 61	3 34
FREDERICK A. POTTS, 110 Broadway, New York.—Port Johnson, Elizabethport and Hoboken.					
L. & W. C. Co.'s Wilkes-Barre	3 00	3 00	3 00	3 00	3 25
L. & W. C. Co.'s Old	3 75	3 25	3 25	3 75	3 25
L. & W. C. Co.'s Plymouth Red Ash	3 00	3 00	3 00	3 00	3 25
L. & W. C. Co.'s Honey-Brook Lehigh	3 75	3 25	3 25	3 75	3 25
Scranton	3 00	3 00	3 00	3 00	3 25

WHITNEY, McCREARY & KEMMERER, 111 Broadway, New York.—John White, Sales Agent.—F.o.b. at Elizabethport or South Amboy.

Upper Lehigh and Conestoga	3 75	3 25	3 25	3 75	3 35
Everhardt Wyoming	3 00	3 00	3 00	3 00	3 25
Wilkes-Barre	3 00	3 00	3 00	3 00	3 25
Shamokin	3 75	3 25	3 25	3 75	3 25
East Spring Mountain	3 75	3 25	3 25	3 75	3 25

A. S. SWORD, 111 Broadway.—Coal at Newburgh.

Pittston Coal	3 80	2 80	2 80	2 85	3 00
G. B. LINDERMAN & CO., No. 111 Broadway.					
Sugar Loaf, (Lehigh)	3 75	3 25	3 25	3 75	3 50

HECKER & DEAN, 111 Broadway.

Lackawanna Valley	3 00	3 00	3 00	3 00	3 25
Kingston, Wm'g White	3 00	3 00	3 00	3 00	3 25
Ash	3 00	3 00	3 00	3 00	3 25
Chaucery Wyoming Red	3 25	3 25	3 25	3 25	3 25
Upper Lehigh	3 00	3 00	3 00	3 00	3 25
Beaver Brook Lehigh	3 75	3 25	3 25	3 75	3 25
Cross Creek Lehigh	3 75	3 25	3 25	3 75	3 25
Elizabethport, N. J.	3 25	3 25	3 25	3 25	3 25

\* Deliverable at Weehawken.

† Auction prices of November 31.

We quote Bituminous Coal as follows:

Cumberland, at Georgetown	3 50	2 50	2 50	2 50	2 50
West Virginia, at Baltimore	4 50	3 50	3 50	3 50	3 50
Newburg, o. b., Baltimore	4 25	3 25	3 25	3 25	3 25
Despard, at Baltimore	4 50	3 50	3 50	3 50	3 50
Brook Top, at South Amboy	4 50	3 50	3 50	3 50	3 50
Morrisdale, Wiggins	4 50	3 50	3 50	3 50	3 50
Cunard, at Philadelphia	4 50	3 50	3 50	3 50	3 50
Consolidation Coal Co. f. o. b., Georgetown	3 50	2 50	2 50	2 50	2 50
Consolidation Coal Co. f. o. b., Baltimore	3 50	2 50	2 50	2 50	2 50
Barber at New York	3 50	2 50	2 50	2 50	2 50
Maryland Coal Co. f. o. b., Baltimore	4 00	3 00	3 00	3 00	3 00
Varyland Coal Co. f. o. b., Georgetown	3 75	2 75	2 75	2 75	2 75

## PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, Dec. 5, 1876.

The past week has been one of the dullest of the many dull weeks which we have had to report during the year. The principal and immediate reasons for this depression have been adverted to and considered in our late reports, and while the same hindrances prevail to as great an extent as before, it is not necessary to go over the ground and repeat them in detail. It is a fact, however, recognized and admitted by all parties, that while the present uncertainty in political matters continues no improvement can possibly take place, while in many instances business is being largely curtailed or entirely suspended. Some of the rolling mills, sheet mills, etc., shut down on Wednesday night for Thanksgiving day, and have not yet resumed operations, and may not resume, unless there is some change in the aspect of things. The general feeling seems to be that nothing of importance will be done this year under any circumstances, and that while the indications a little while ago were all in favor of an increased business after the holidays, it is thought now that the present inactivity may continue until after the actual inauguration of the new president. This condition of affairs is greatly to be deplored. After the depression our industries have been suffering for months past, it is peculiarly unfortunate that they should be again thrown back at the very moment when they were beginning to revive into life and activity. Orders from the South, which under ordinary circumstances would have been filled with prompt satisfaction, are held in abeyance. Large contracts on the point of being closed are waiting further developments. Nothing is being done; the whole country is waiting for some definite settlement of the political question. A good many inquiries are still being made, and there seems to be some important projects under consideration, and it is yet hoped that the new year will bring with it a better state of affairs. The most cheering feature we have to note in the business of this city is the extraordinary growth of the export trade. The increase of November compared with the previous month is about 50 per cent. The eleven months of 1876, as compared with the whole of 1875, show a still greater ratio of increase, the exact figures being as follows: 1875, \$29,065,879; eleven months 1876, \$45,487,013. In this connection we may note the fact that some orders for machinery and other manufactures are being received from various parts of Europe, which it is anticipated will develop into a permanent business. As being of special interest to our readers we may mention an order received on Saturday by Lovegrove & Co., of this city, for one of their Whitmore engines for Germany. Loneragan & McBride also received three orders (Sweden, Germany and Holland) for a full line of patent oil cups and automatic steam chest and cylinder lubricators. We are also informed of sample orders in other branches, and it is satisfactory to know that efforts are being made in this country to open a trade with distant nations, and that they in return by their selections appear willing to give the matter a fair trial. The sale of buildings at the Centennial grounds shows a fearful

slaughter. The first cost being \$2,319,493; the proceeds of sales, \$288,000. The cost of removing, however, will be very considerable, and an Agricultural Hall, or a Woman's Pavilion and similar structures, are not articles required for everyday use.

**Pig Iron.**—Continues about the same as last week. The demand does not improve and prices are unsettled, although sales are mostly at about late quotations. Stocks are gradually getting into small compass, and if the present ratio of supply and demand is continued, no further decline will be likely to occur. On the other hand, it is very unlikely that an advance could be maintained or attempted while so many furnaces are lying idle, some already filled and ready for blowing in at any moment. Perhaps the most that could be fairly expected in case of a revival in trade would be that a few more furnaces might place their product at present prices without causing a break in the market. From present appearances, however, it is very improbable that there will be sufficient increase in the demand to warrant much addition to the present production, but whether or not production will be regulated by consumption is very doubtful. Meantime, the Bechtelsville will blow in a furnace next week, and the Kutztown one, while the Glendon have two filled ready for blowing in, the Henry Clay one ready, and the Thomas Company have one ready also. It is not likely that any of these will blow in before January, and perhaps not then, but if business seems to warrant any increase, they are ready for immediate operations. In many quarters the opinion is expressed that the Iron trade must remain in its present condition for a long time to come. It is argued that the development of the railway system of this country absorbed large quantities of Iron formerly, but that source of demand is, in a large measure, now closed. The use of Steel Rails on the most prominent lines has seriously affected the demand for Iron, and as the roads are now almost completely equipped and Steel Rails do not require to be renewed very often, it is argued there cannot be any such demand from the railways as formerly. This view of the case may be worth attention; in the meantime it is not without influence in some quarters, and may partly account for the continued depression. We quote prices as follows, sales all being in small lots: No. 1 Foundry, \$21 to \$22; No. 2 do., \$19 to \$20; Gray Forge, \$18-50 to \$19-50.

**Blooms.**—Business continues dull in this as







7,725 tons in September, the augmentation being chiefly from Thornecliffe, Wharfedale, and other large pits. West Yorkshire, ten sent a large quantity. The Midlands, as usual, was mostly supplied by the Derbyshire collieries, thirteen of the chief of which alone sent fully 130,000 tons to the metropolis. Clay Cross, Langley and Tibshelf each send 1000 tons daily. The North Western draws its coal from the Wigan and Cannock Chase fields, and the Great Eastern is necessarily supplied over the Great Northern and Midland. The Great Western, as is above shown, is now becoming one of our leading coal conveying systems.

In cutlery, the leading houses are still doing a moderate amount of business, chiefly on best table and spring cutlery.

#### FUTURE PROSPECTS OF SHEFFIELD.

At a banquet given here on Friday night, Mr. Mark Firth (head of the great steel firm of Thomas Firth & Sons), spoke on the subject of the trade of Sheffield. He said: All in that room knew that the trade of Sheffield was very bad. He had not known it so bad for 25 years with so long continuance. Sheffield had during the last few years had a great time of prosperity, no town, he believed, having had such a prosperous time. He had known for the last 25 years several times of panic, which had occurred at nine or ten years' interval. Trade had been bad for a time from contemporary causes, such as overtrading, and overtrading by which trade got spoiled. But it recovered itself in time, and therefore, he believed that not only Sheffield but England would recover from the present depression of trade, as had hitherto been the case. He must, however, say that he believed that the trade of Sheffield had arrived at a maximum, and he would tell them why. If they looked around the continent, Germany, France, Belgium and other countries had commenced to manufacture goods which they had hitherto received from Sheffield. England once had the supplying with iron and steel of almost every part of Europe, but such was not now the case. Their friends across the Atlantic, who were pretty sharp—and he did not say it offensively—had a knack of protecting and looking after themselves. He did not hesitate to say in public that the Americans in that respect had acted in an extremely selfish manner. The markets of England, her Colonies, and India were open to American and other manufactures, whereas, on the other hand, Sheffield goods and English goods sent to America were taxed at a rate exceeding almost the tariffs of every other part of Europe. America, moreover, was now making steel, cutlery, saws, tools and other articles she had been wont to have from Sheffield. There was, however, another thing to be looked at, America would not only supply herself with these things, but would also become our competitors in the markets in Sheffield, in our Colonies and in the American markets. That was what made him think that we had come to the climax of trade as regarded the American markets, at least at present.

There no doubt would be a great increase in Sheffield trade, but not in the same proportion as in the past. What then had we to look forward to in the increase of the trade of Sheffield? Not an increase with the trade to America, but, notwithstanding that, he did not for a moment mean to say that the present stagnation would last—but he believed we should never regain the position we once held with regard to the Sheffield markets. He must, however, be permitted to say, in conclusion, that he felt grieved that America should charge the extraordinary tariffs it did to English manufactures when the English markets were free to all.

Dr. Webster, the American Consul also spoke, saying that he had come to feel at home in Sheffield, and if ever the time came when he should be called to break the ties and friendships that bound him here he should break those ties with very great regret. He had lived in this town long enough to have broken somewhat many ties that he once had across the water. He alluded to the generous manner in which Sheffield had responded to the call which came across the water from Chicago when the great fire occurred, and he said that the generosity of the town had been much appreciated by the Americans. In regard to the trade of Sheffield, all present knew that at present it was very bad. In 1873-'74 trade might almost have been said to have been at fever point, and a reaction was necessarily to be looked for. He hoped, however, that ere long trade—especially with America—would increase, and that a time of great prosperity was before the town.

#### BIRMINGHAM AND STAFFORDSHIRE

continue to grumble amazingly at the dullness which pervades almost every branch of the iron trade, the only departments transacting any business worth naming being the foundries, the safe makers and the metallic bedstead manufacturers, albeit in one or two directions there is a fair inquiry for galvanized iron and stamping sheets. All merchant irons are neglected, "list" prices meantime being but a delusion and a snare. The hardware industries are tolerably well engaged all round, principally on home and Colonial account.

#### SOUTH WALES.

The total shipments of iron from all Welsh ports for the ten months of this year has been 56,777 tons, October contributing 3173 tons. During October the fuel (coal) shipments from the same ports were 418,164 tons, of which 14,000 went to Singapore, 30,173 to Malta, 50,000 to French ports and 15,446 to Constantinople. Under 9000 tons went to Odessa. At the iron works there is very little work doing, but Downla is now likely to be a little busier, having secured a fair-sized steel rail order.

#### THE METAL MARKETS

have declined somewhat, except lead, owing to the political crisis.

Von Dadelzen & North say: "Copper.—Foreign easier. Chili bars have been sold from £70 to £77. 15/., both on the spot and to arrive. The market closes steadily at £77. 15/., to £78 for g. o. b. Wallaroo sold at £86. 15/., Burra held for £85. 10/.. The associated smelters have advanced their official prices to £85 for tough, £87 select and £92 for strong sheets, but purchases can be made in the market below this. Tin.—Straits, after advancing to £79, has rapidly declined, and the last quotation is £76 to £78. 10/.. Australian touched £77. 10/., and has declined to £76. The main business was at £76 to £77 during the upward move. Banca in Holland has fluctuated violently. It advanced from 46 1/2 to 48 1/2, and fell to 45 1/2, closing at 46 1/2; Billiton, 45 1/2. English ingots are quoted £83. Tin plates in moderate demand. Lead firm; £22. 5/ to £22. 10/ for English pig. Spelter.—Ordinary Silesian done at £22. 17/ 6; and 100 tons W. H. £23. 3/ 6, in outputs. Quicksilver.—Dull. 49 per bottle. Antimony firmer; £55 to £56."

The Mining Journal remarks: "Lead.—The firmness of the market has continued, and prices have advanced about 5/ per ton. Spelter.—In fair inquiry, but prices are unchanged. W. H. has been sold at £23. 3/ 6, in outputs. Quicksilver.—Dull. 49 per bottle. Antimony firmer; £55 to £56."

Latest Liverpool advices are these:

#### Iron: f. o. b. in Liverpool, per ton.

	£	s.	d.	£	s.	d.
Merchant bar	45	0	0	45	0	0
Merchant bar, in Wales	45	0	0	45	0	0
Staffordshire	45	0	0	45	0	0
Sheep	45	0	0	45	0	0
Sheet	45	0	0	45	0	0
Nail rod	45	0	0	45	0	0
Bar, best crown	45	0	0	45	0	0
Roller plates	45	0	0	45	0	0

#### Tin Plates: f. o. b. in Liverpool, per box.

	£	s.	d.	£	s.	d.
Charcoal, I. C.	1	4	0	1	4	0
Coke, I. C.	0	19	6	0	19	6

#### Copper: Delivered in Liverpool, per ton.

	£	s.	d.	£	s.	d.
Bolt and Sheathing	85	0	0	85	0	0
Tie	85	0	0	85	0	0
Tough cake	85	0	0	85	0	0
Best selected	87	0	0	87	0	0

Messrs. Harrington, Horan & Co. (Liverpool, Nov. 10th) thus report on copper: The active demand for copper was considerably stimulated by important purchases of furnace material, made by the English smelters, and altogether an unusually large business has been done in bars for the trade, and on speculative account. During the fortnight the transactions comprised about 6500 tons Chili bars at £76. 10/ to £79 per ton. One cargo Bolivian ore and regulus combined, at 15/ 7 1/2 per unit; one cargo Chili regulus at 15/ 9; two cargoes Chili ore at 15/ 6 and 15/ 9 per unit respectively; eight cargoes Chili regulus at 16/ 1, and about 3000 tons Californian ore at 15/ 3 to 15/ 7 1/2 per unit. Beside the above, large contracts have been entered into for copper precipitate, at prices based on monthly sales of Cape ore and Chili regulus. Chili copper charters for the second fortnight of October, were 2900 tons fine copper, composed of 1600 tons bars for the Continent, 700 tons bars and 600 tons ore and regulus for England. At the Swansea sale, by tender, on the 7th instant, 1442 tons ore, average produce 17 13-16 per cent., realized 16/ 2 1/2 per unit. The Cape ore sold at 16/ 2 1/2 per unit. Yesterday the smelters officially advanced their prices to £92 per ton for strong copper. To day there is a pause in the demand for bars, and prices have receded about 20/ per ton from the highest point touched. Quotations are:

	To Day.	Nov. 15, 1876.
Chili bars	£78 to £79	£82 to £83. 10/
" ingots	285	290
" ore and regulus	15/ 9 to 16/	16/ 6 to 17/ 1 1/2
Corocoro Barilla	17/	18/ 3
Chili bars	Nov. 15, 1874.	Nov. 15, 1873.
" ingots	£88 to £90	£82 to £86
" ore and regulus	299	295
Corocoro Barilla	17/ 6 to 17/ 6	15/ 6 to 16/

#### ARRIVALS HERE DURING THE FORTNIGHT OF WEST COAST S. A. PRODUCE.

	Bars.	Ingots.
" Illemani," from Valparaiso	595	150
At Swansea—Nil:		
Stocks of Copper (Chilian and Bolivian) in first and second hands, likely to be available, we estimate at:		

	Ores.	Regulus.	Bars.	Ingots.
Liverpool	681	804	8857	166
Swansea	681	2194	2188	
	681	2998	11,343	166

representing about 12,981 tons fine copper, against 14,649 tons 31st ultimo; against 12,559 tons fine copper November 15, 1875; against 10,900 tons fine copper November 15, 1874; against 21,100 tons fine copper November 15, 1873. Stock of Chili copper in Havre, 7500 tons fine. Stock of Chili copper adrift and chartered for to date, 13,000 tons fine. Stock of Foreign copper in London, chiefly Australian, 2693 tons fine.

According to the Board of Trade returns, the total imports and exports into and from this country for the first ten months of the following years, were:

	1874.	1875.	1876.
Imports.			
Copper in ores	6,080	6,819	9,388
Copper in regulus	10,583	12,605	10,944
Bars, cakes and ingots	32,651	34,718	31,920
In pyrites, estimated	11,061	11,723	11,447
Total	60,395	65,865	63,699

	1874.	1875.	1876.
Exports.			
English copper, wrought and unwrought	18,367	19,066	18,763
Foreign copper, unwrought	30,979	12,190	14,842
Yellow metal	15,094	11,695	10,465
Total	51,220	42,951	44,069

Tin.—Market quiet at £78 for Straits, £77 for Australian, £80 for British, and £85 to £88 for Peruvian as in quality. Lead.—Market firm at £22. 15/ for ordinary shipping brands, and £22. 5/ for Spanish without silver. Spelter.—Market firm at £22. 15/ to £23 for ordinary Silesian brands.

#### Improved Pyrometer for Blast Furnaces.

In the management of smelting furnaces for the reduction of iron ores, a highly important consideration is the temperature of the hot blast stoves, which, in order to give the best results, require to be kept at an ascertained and uniform degree. Although this fact has long been known and appreciated, and numerous attempts have been made to meet the requirements of the case, yet until a comparatively recent date the imperfect and unreliable character of the several forms of apparatus for indicating variations of high temperatures has rendered the operation but little better than guess work, the range of variation of the instruments on either side of the true point being so great as to render an approximation of temperature almost as easy without as with their use. Mr. Edward Brown, of Philadelphia, Pa., a thoroughly practical mechanical engineer, has for several years past devoted much attention to the construction and introduction of a pyrometer of a reliable and durable character, whose use would prove to be of real and unquestionable value. Recognizing the probability that the principles of some, at least, of the various types of pyrometers were correct, and that their inefficiency was due only to imperfect or erroneous development in details, Mr. Brown selected as the best, all points being considered, the Gauntlett pyrometer, in which the difference in expansion between a bar of plumbago and a tube of metal is the principle used. By carefully noting the defects of this instrument as demonstrated by practical use, Mr. Brown succeeded in correcting them in a manner both simple and efficient, producing a pyrometer by means of which temperatures as high as a red heat of 1200° F. can be accurately and uniformly indicated. Viewed in an entirely scientific light, this and all other forms of pyrometer are open to strictures, as we have no positive standard for rating and graduation, but must assume a

certain ratio of expansion for a degree of heat, generally based upon some point below the boiling of mercury. Practically considered, however, this is of no consequence. We know that certain temperatures produce certain effects, and so long as we have an instrument by means of which we can tell when such temperature is reached, it is of little importance to the result whether we call it 1200° or 1500°, all that is necessary being a uniform rating in the various forms and modifications of the instrument, thus giving us an approximate standard, whose practical value is equal, or nearly so, to that of a true ascending mercurial scale. The instrument under notice is composed of a stem and a circular dial, similar in all respects to that of an ordinary pressure or vacuum gauge. The stem is made of wrought iron tubing, to which is attached, by means of a screw nipple, the dial case, and about 6 inches below the latter, a flange or collar. The lower or free end of the tube is closed by welding a plug therein. A bar of plumbago fills the interior of the tube, leaving only sufficient space to allow of free movement longitudinally, and is attached at the lower end to the plug, while the upper end connects with the segment gear by means of which the index is operated. The operation may be explained in a few words. The stem of the instrument being introduced, as far as the flange, into the hot blast or wherever it is desired to be used, and as the temperature rises the tube expands a certain fraction of an inch for each assumed degree of the scale. Now, were the rod connecting the end of the tube with the index of the same material as the tube, it would, of course, compensate for this expansion by lengthening upward as much as the latter receded, and thus there would be no indication of expansion by the index. But as plumbago is known to expand very slightly with any temperature to which this form of instrument can be applied, it is used to form the connection between the moving end of the stem and the index, and, as a matter of course, as it always remains of the same length, any variation in that of the tube must be communicated to the index. The only deterioration of the instrument is in that portion of the tube which is exposed to the heat; but even this is not to any serious extent, as at a temperature of 1200° a tube will last from 8 to 12 months, and when worn out may be replaced at little expense or trouble. A very excellent feature of these instruments is a screw for adjusting the index, so that it may be true at atmospheric temperature by comparison with the thermometer, or, as often happens, in case it is desired to keep secret the temperature used in any operation, it may be set 100° or 200° either side of the true point, and allowance made for the variation in calculating the temperature. In addition to the above, Mr. Brown has designed a portable pyrometer for use as a standard in regulating those which are constantly in use, thus affording a check upon the latter and preventing the possibility of any variation being unnoticed or neglected for any considerable time. Another very excellent instrument included in Mr. Brown's Centennial exhibit was a mercurial revolution indicator, a very accurate and reliable instrument for determining the speed of engines, shafts, &c., &c. It attracted much attention from scientific men, particularly the representatives of several of the technological schools and colleges of Europe, all of whom purchased specimens for their respective institutions.

roll through the roll, so that a line from the head to the flange through the web will not form a right angle with the axis of the rolls, the rolls will squeeze it on all four sides of the rail, reducing its diameter and giving after several passes an oblong, flat bar.

For slitting rails there are two machines in use. One we illustrated in our issue of November 21. This is a cutter acting like a shears, and in principle like the old rail rod splitter. The machine in use at Swtth's, in Syracuse, is somewhat different. It consists of two rolls shaped so as to take in the roll on its side. Each roll has two chilled cutting edges the length of the web apart, those of one being exactly opposite the corresponding ones in the other, and the circumferences one-sixteenth of an inch apart. The rail is fed to the rolls and is scored so deep at the head and flange as to separate in most cases into thin pieces, which are afterward straightened.

#### The Sherman Puddling Process.

We find the following in the *Journal of the Iron and Steel Institute*: After the numerous experiments made in England, with altogether negative results, we do not expect to hear more about this process, especially as at the meeting of the Societe de l'Industrie Miniere, of the 1st April this year, M. Euverte communicated the results of the experiments made with this process, and the conclusion which he arrived at was that it did not appear to have any influence on the quality of the steel, and was not worthy of further consideration by metallurgists. The president of the meeting, M. de Cizancourt, however, protested against these conclusions, declaring that at M. Verdier's Iron Works there had already been more than 1200 tons of metal containing phosphorus treated by this process with complete success; and at the subsequent meeting of the society, M. E. Verdier read a communication in reply to the paper of M. Euverte, to the effect that the results obtained by using the Sherman process at the Firminy Iron Works proved that, even when the amount of phosphorus present was greater than at Terre Noire, the steel produced was more carburized, purer, contained less phosphorus, and was made at a lower price. M. Verdier admitted that the reagents employed did not consist only of the 30 grammes iodide of potassium, but were alkaline salts in the proportion of two kilograms per charge, the iodide included, which is, therefore, not exactly the same as specified in Sherman's patent.

#### The German Tariff on Iron.

The Secretary of the British Iron Trade Association is informed by the Foreign Office that Her Majesty's Ambassador at Berlin reports there is good reason to believe that there will be no change with respect to the proposed abolition of existing duties on iron entering Germany, and that these duties will consequently cease on January 1st. On this subject the German correspondent of the *Economist* says: "The most important news reaching us from Berlin is the Ministry's declaration to pronounce itself decidedly in favor of not putting off the abolition of duty on iron on any consideration. It is true that German steel manufacturing is at present in a very low state, but it is generally

#### The Utilization of Old Steel Rails.

One of the most serious problems that confronts the Bessemer steel industry, is the utilization of old rails. The crop ends produced in the manufacture of rails have been a burden, and it has hardly been possible to dispose of these. The uses to which Bessemer has been put, other than in rails, has been scarcely sufficient to utilize these crop ends, and though a vast amount of thought and experiment and time has been spent in seeking other uses, and in many cases with success, we can scarcely believe the demand for these purposes for years will be large enough to make much of a market for old rails. At Sandvik, in Sweden, where no rails are made, but the steel is worked up into other forms, such as tools of various kinds, swords, plates, etc., the entire output is but 7500 tons per annum. An extension of its use to plates, girders, bridge iron, etc., may make a larger demand, but this will not increase the use of crop ends and old rails, but will demand ingots.

The great obstacle to the more extended use of old rails is the difficulty of getting them into workable shape. Though many attempts have been made to pile and weld them, it never has been made a commercial success, at least to any great extent, the bars not being good enough even for splice bars. The use of purer pigs might give a steel more easily welded, but that is expensive. The methods in use for bringing crop ends into workable shape are, in principle, two, and the same could be applied to the utilization of old rails. The first is by rolling the rail in such a manner as to compress it into a billet or bar, and the second by slitting the rail either by cutters like shears, or by rolling it so thin at the union of the web and head and web and flange that it readily separates into three pieces.

The first method is in use at the Cleveland Rolling Mill. The rail is heated and given nine passes through rolls especially prepared, the position of the rail being changed at every pass, and the size and shape of the grooves such that the web is thickened and the flange reduced in width, giving a nearly square bar as the result. The Edwards & Rogers patent is somewhat similar. It is well known that in rail rolling after the first two or three passes the diameter of the rail is not decreased, the pressure of the rolls being only in two directions from the top and bottom, by which the length is increased, and the web and flange shaped. In passing the

thought that the continuance of one mark duty on every hundred weight of iron will not be a means of raising it. German iron industry has grown to such an extent that it cannot subsist except by the export of enormous quantities to foreign countries, and this can only be the case when quality is first rate and prices are moderate. The words contained in the German Emperor's speech at the opening of Parliament, to the effect that 'the German government intends staying off all danger which might arise to German industry by new arrangements in questions of commerce and duty planned by other countries (the government will act in this direction when the renewal of the commercial treaties take place),' are, it is generally believed here, intended as a warning to the Austro-Hungarian government."

Canada is beginning an export trade in a small way. A vessel sailed from Montreal the other day laden with Canadian manufactures, mostly of wood and iron, and including furniture, farm implements, steam engines, and many other articles of utility, which have already found a market in Australia. The shipment is understood to be the pioneer of an extensive trade for which arrangements have already been made.

#### Mr. Mundella, a leading British manufacturer and member of Parliament, in a recent address in England, predicted a "pinch" for the working classes there this winter. Next spring, however, he thought would bring better times, the dawn of which he believed he could now distinguish. The world, having used up its surplus stocks of goods, needed fresh supplies, and they must be provided, thus reviving all branches of industry—producing, manufacturing and transporting.

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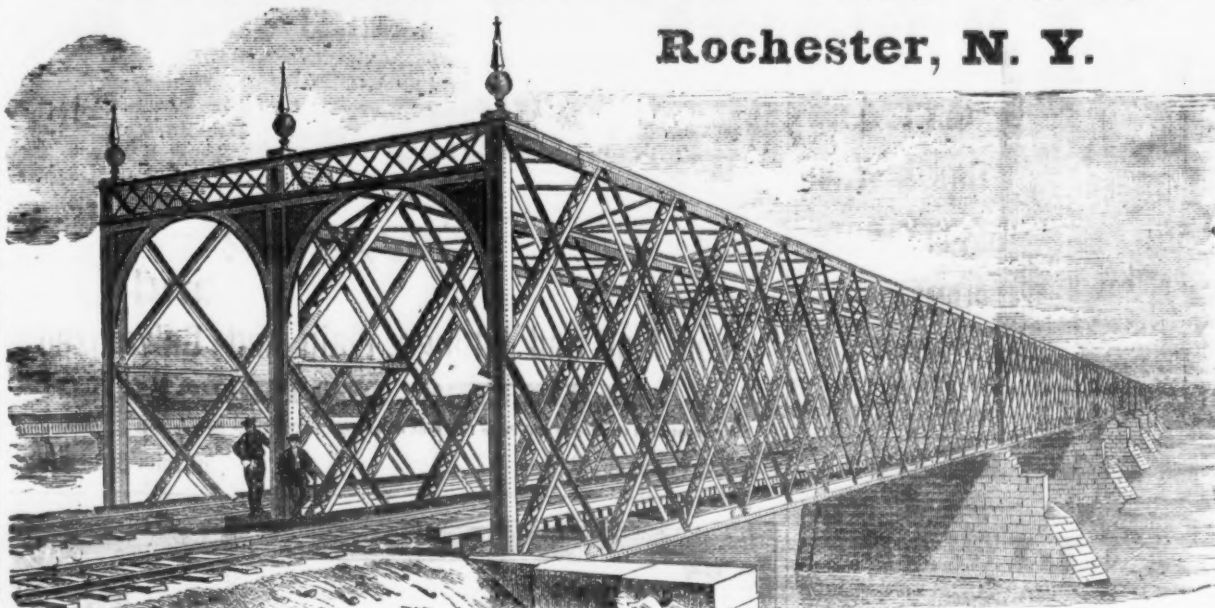
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full size of the larger part of the so called  
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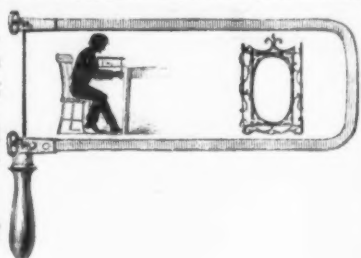
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in use, on account of the fibrous nature of the wrought iron—causing it to "settle"  
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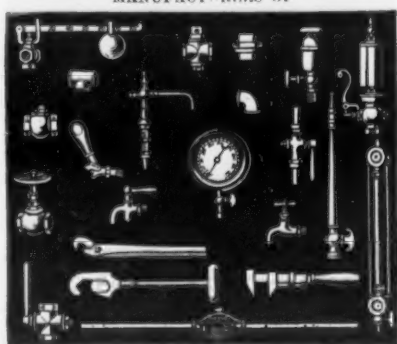
The body of the Eagle Anvil is of crystallized iron, and no settling can ever  
occur; the steel face, therefore, remains perfectly true. Also, it has the great ad-  
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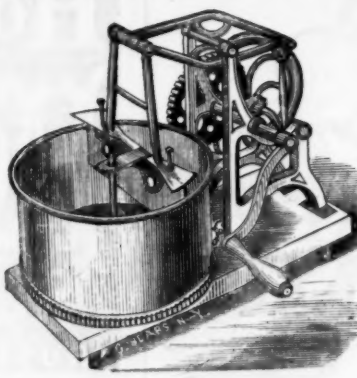
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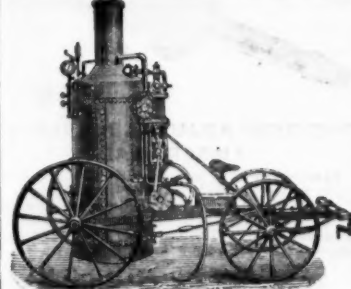
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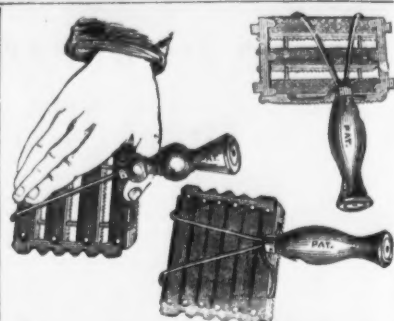
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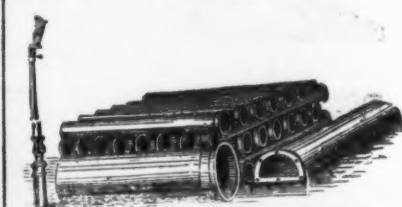
	3 H	4 H	5 H	6 H	8 H
Horse Power.....	3 1/2	4 1/2	5 1/2	6 1/2	8 1/2
Diam. of Cylinder.....	4 1/2	5 1/2	6 1/2	7 1/2	8 1/2
Length of Stroke.....	200	200	200	200	200
Number Rev. per minute (3 speeds).....	200	250	250	250	250
Diam. Fly Wheel.....	12	12	12	12	12
Face of.....	4	4	4	4	4
Diam. of Boiler.....	24	24	30	30	36
Height.....	60	61	72	76	78
Number of 2 in. Flues..... 3 and 4	22	22	27	27	35
Horse 1 1/2 in. Flues.....	20	24	27	31	35
Length of Flues.....	1500	1600	2100	2250	3200
Estimated weight of Engine and Boiler Portable in lbs.....	1500	1600	2100	2250	3200
Price of Portable, without Whistle, Glass Gauge, Stack, Heater or Blower.....	\$275	\$300	\$325	\$360	\$385
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the shank over the back to the front teeth give strength  
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and at the same time serve as an extra handle; and  
when clasped by the fingers in connection with the raised  
shank the comb is more firmly, easily, and completely  
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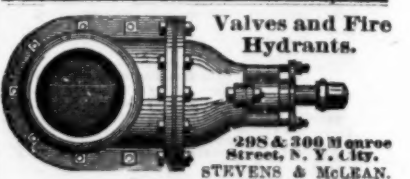
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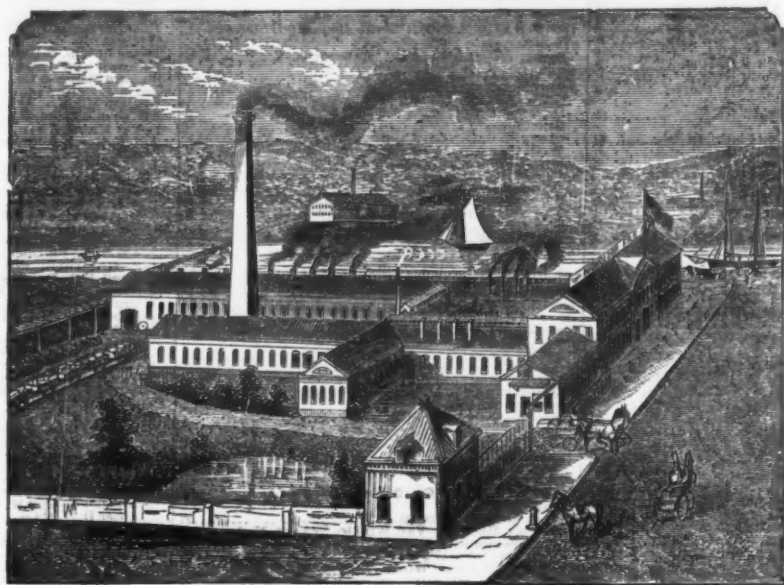
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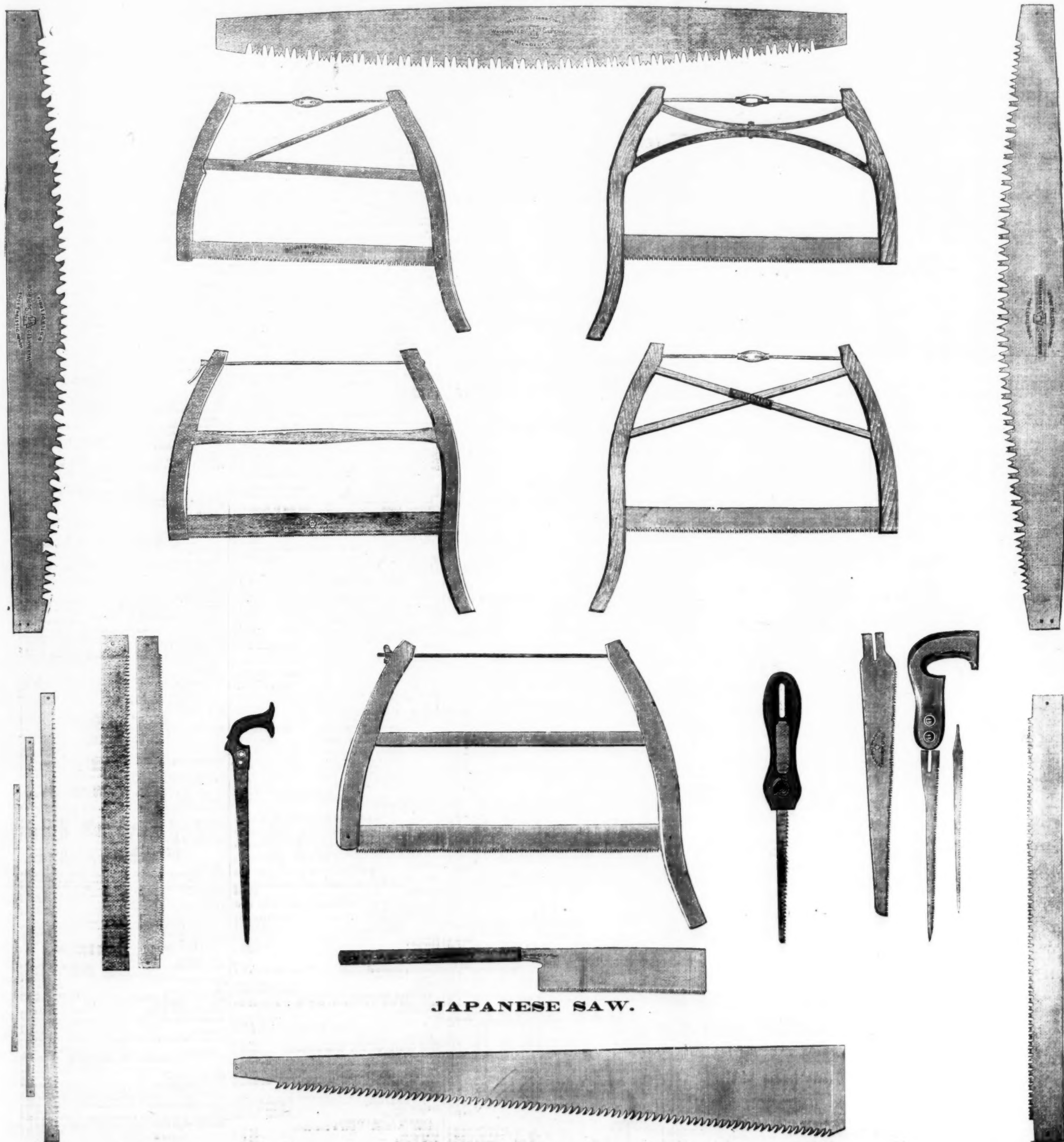
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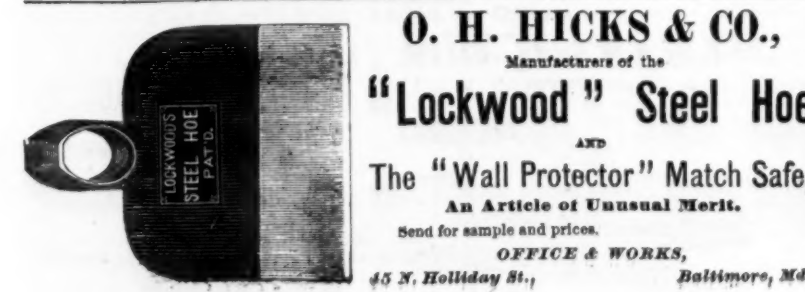


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Agent for the Philadelphia Star Carriage and Tire Rolls

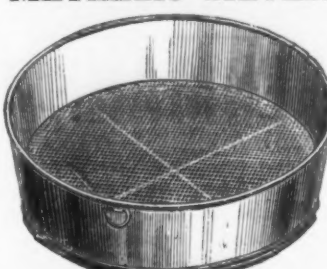
Established in 1836.

Shelton Company,  
Manufacturers of every variety of  
TACKS & SMALL NAILS.

Carriage, Machine, Floor, Stove and  
Tire Rolls, Coach Screws,  
Bed Screws, &c.

BIRMINGHAM, CONN.

## METALLIC SIEVES.



MANN'S PATENT.

Best Sieve known; Clean, Neat and Durable.

GEO. E. DAYTON, Manufacturer, Chicago.  
GRAHAM & HAINES,  
General Agents, New York.



Established in 1839.

A. G. COES & CO.

WORCESTER,

Mass.,

Manufacturers of

THE GENUINE

COES'

## SCREW WRENCHES.

Our goods have been very much improved recently, by making the Bar WIDE, as shown in the cut, which makes a 12 in. Wrench as strong as a 15 lb. made in the ordinary way, and by using

A. G. COES'

NEW PATENT

## FERRULE

Which cannot be forced back into the handle.

Our goods are manufactured under Patents dated February 7, 1860, (re-issued June 20, 1871), May 2, 1871, and Dec. 26, 1871, and any violation of either will be rigorously prosecuted.

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.

MODEL

## Scroll Saws,

(Best in the Market.)

Flower Pot Brackets,

Self-Acting Fountains,

AQ ARIA, FILES, VISES,

And Specialties in

HOUSE FURNISHING GOODS.

Send for price lists.

G. WEBSTER PECK,  
Manufacturers' Agent,

110 Chambers Street, N. Y.

JOHN I. BROWER & SON,

288 Greenwich St., N. Y.

General Assortment of

## HARDWARE

For the Country Trade.

Romer's Padlocks,  
WINSTED TOE CALKS,

D. E. FELTER & CO.'S ICE TOOLS,

A full line constantly on hand.

Lloyd, Supplee & Walton,  
HARDWARE FACTORS.

MANUFACTURERS OF

Bonney's Hollow  
AUGERS.

Stearn's Hollow Augers

and Saw Vises

Bonney's Spoke Trimmers

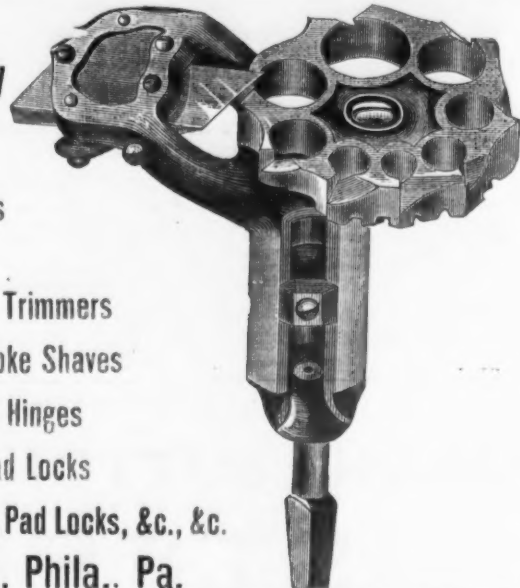
Double Edge Sook Shaves

Adjustable Gate Hinges

Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila.. Pa.



## The American Club Skate Still Ahead.



After the severest tests for the past four years, these skates are now admitted to be the only practical SELF-ADJUSTING SKATES IN MARKET. The clamps are first adjusted to the shoe by turning the thumb-screw D when the lever C is in the above position; when once adjusted, place the skate on the foot, close the lever C, and the skate is securely fastened to the foot. By the action of the clamps, the skate is always in the center of the foot, and cannot slide from side to side as in other clamp skates. They require no heel plates, key or wrench.

PRICE LIST.

Per Pair.

No. 1.—With Blue Footplate, and Runners the same as the best. \$5 00  
No. 2.—Same as No. 1, only nicely Nickel Plated. Effectually prevents the skate from rusting. 6 00  
No. 3.—Same as No. 2, only before the skate is put together each part is finely Polished and heavily Nickel Plated, the finest skate ever offered. 8 00

Sole Jobbing Agents for WINSLOW'S WOOD TOP SKATES.

Special trade catalogue sent on application. Address,

PECK & SNYDER, Manufacturers, 126 Nassau St., N. Y.

## PHILIP S. BIGLIN,

Successor to W. F. SHATTUCK & CO.,

Manufacturers' Agent for

## AMERICAN HARDWARE.

95 Reade & 113 Chambers Sts., New York.

Shattuck's Union and Counter Scales,  
Pheasant's Axes, Hatchets, Picks, &c.  
Wellman's Tumbler's, Gimlet Bits, &c.  
Grissold's Augers, Auger Bits, &c.  
Gilroy & Co.'s Stocks and Dies.  
Yaw's "Genuine" Wrought Cow Bells.  
Baron's Hand and Sleigh Bells.

Mally's Britannia and Cocon Dippers,  
Eddy's Regined Lamp Black,  
"Eagle" Axe, Pick and other Handles,  
"Boreha" Flint, Sand and Emery Papers,  
Cortland Forged Horse Nails,  
Tuckie Blocks, Spokes, &c., &c.

## GREENFIELD TOOL CO.,

Greenfield, Mass.

Sole Manufacturers of the Celebrated

## "Diamond" PLANE IRONS

EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES. The only Shoe made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description, &c., &c. Drop Forgings to order. Address for Catalogue with stamp.

## WILSON MANUFACTURING COMPANY.,

NEW LONDON, CONN.

MANUFACTURERS OF

## SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws; Parallel Bench Vises, Sash Pullies, Ho House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Biggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse, 97 Chambers and 81 Reade Streets, N. Y.

## HERMAN BEHR &amp; COMPANY

Manufacturers and

Importers of

## GLUE

261 Pearl Street,

New York City.

## Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.

## VALVES

(Double and Single Gate, 1/2 in. to 48 in.—outside and inside Screws, Indicator, &c.)  
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

## MALTBY, CURTISS &amp; CO.,

Manufacturers of METAL KEY MAPLE AND ROSEWOOD FAUCETS.

Also Manufacturers of

Capewell's Giant Nail Puller.

The Buell Peg Float

AND THE

Little Giant Tack Puller,

84 READE ST., N. Y.





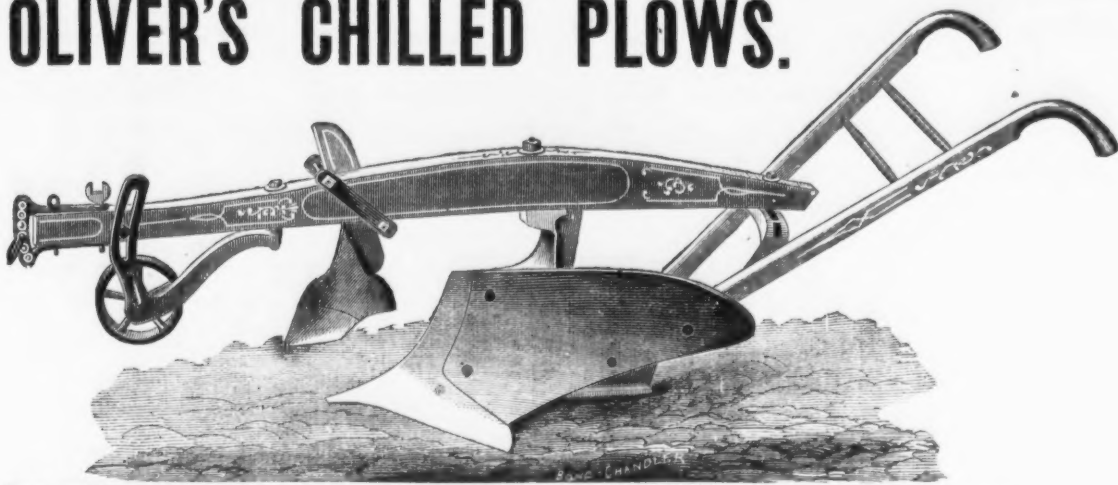








# OLIVER'S CHILLED PLOWS.

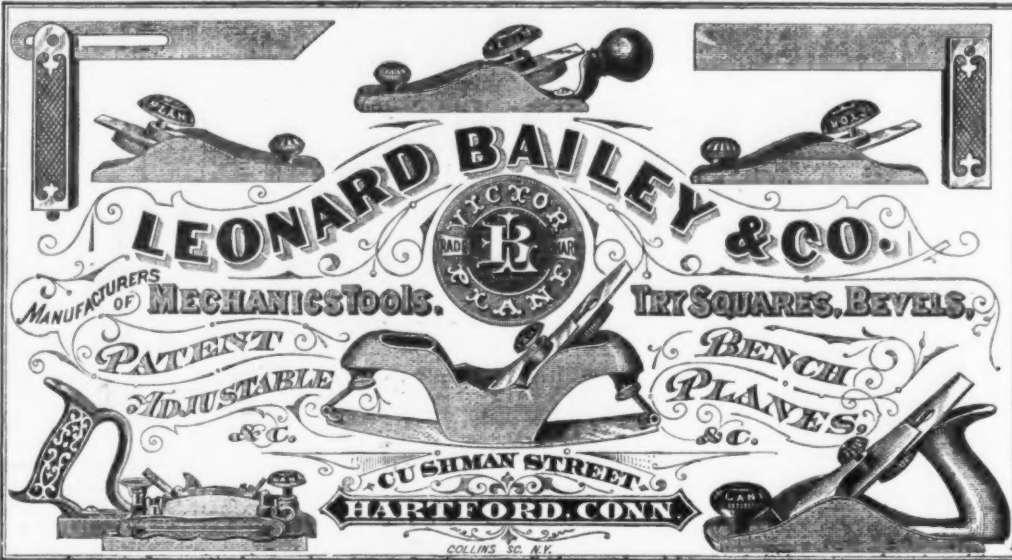


These implements, though but four years before the public in their present form, show the following remarkable record:  
 1506 were sold in the season of 1871. 7472 were sold in the season of 1873. 31,077 were sold in the season of 1875.  
 3949 " " 1872. 14,976 " " 1874. 42,139 having been sold the past spring.

The sales for 1876, will undoubtedly exceed 60,000 Plows. For full descriptive circulars, address,  
**SOUTH BEND IRON WORKS, South Bend, Ind.**

THE VICTOR PLANES

Are the most simple, compact and practical Adjustable Planes ever offered to the public. They are made under the personal supervision of Mr. L. BAILEY, the original inventor of L. BAILEY'S PATENT ADJUSTABLE IRON PLANES. All our Planes have our Trade Mark. Send for Catalogue, embracing Planes, Try Squares, Bevels, Rules, Levels, Hammers, Mire Boxes, etc., etc.



## THE SAMSON WRENCH

RECEIVED THE CENTENNIAL MEDAL AND DIPLOMA OF MERIT.



It is the only positive Wrench that will hold Gas or Steam Pipe, Gas Burners, Round Iron or Steel without slipping. Samples sent to the trade only, on receipt of fifty cents and business card.

**W. J. FLANAGIN & CO., Sole Manufacturers,**  
 Office, 32 North 5th Street, PHILADELPHIA.

## THE BILLINGS & SPENCER CO.,

HARTFORD, CONN.

Die Plates and Dies, Genuine Packer Ratchet Drills, Clamp, Die and Common Lathe Dogs, Barwick Wrench and Pipe Tongs, the Billings Patent Sewing Machine Shuttles, Marlin Spikes, Calkers' Tools, Clinch Rings, Saw Sets, Screw Drivers, And all description of IRON AND STEEL.



Drop Forgings.

## THE ULSTER SLED.



(PATENT APPLIED FOR.)

In presenting to your notice our **ULSTER SLED**, we introduce an article that has long been needed in the trade, viz.: a light, yet strong and durable sled. This has been accomplished, as the entire running gear, runners and cross-bars, are formed by a single piece of metal. The hopes and efforts of the inventors and manufacturers of our country have been directed toward reaching, in this our Centennial year, perfection in their respective productions, and we now leave it to the public and their children to decide whether we have been successful or not.

**CROSBY, GILZINGER & CO., Manufacturers, RONDOUT, N. Y.**

## GOLD MEDAL

## Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

**PERMANENT ELASTICITY.**

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality, compare favorably with our other well known brands.

**BENJAMIN F. BADGER & SON, Manufacturer**

Badger Place, Charlestown, Mass.

## THE "DUCKHAM" PATENT

Suspended Self-Indicating WEIGHING MACHINE.

Capacities from 1 to 100 tons. This machine is used on a crane or any lifting apparatus, and indicates the weight on the dial directly the article is lifted. It is accurate, requires no adjusting, portable, and the greatest labor-saving weigher ever introduced. Send for Circular and Price List.

**ROBERT KING,**  
 MANUFACTURER,  
 Hydraulic Presses, Accumulators, &c.  
 246 to 250 Plymouth St., Brooklyn, N. Y.

**Fairmount Machine Works,**  
 OFFICE, 100 WOOD ST., PHILADELPHIA.  
 Manufacturing and Repairing all kinds of Machinery, Steam Engines, Boilers, Pumps, and all kinds of Iron and Steel Work. Also, the construction of all kinds of Bridges, Docks, and other large works. We also have a large stock of all kinds of Iron and Steel, and are prepared to make to order all kinds of Castings. We are also prepared to repair all kinds of Machinery, and to put up all kinds of Boilers, and to construct all kinds of Bridges, Docks, and other large works. We are also prepared to make to order all kinds of Castings, and to repair all kinds of Machinery, and to put up all kinds of Boilers, and to construct all kinds of Bridges, Docks, and other large works.

## D. M. MEERER & SON'S

MALLEABLE IRON HOLLOW MOUNTED WINDOW SASH.

For Insane Hospitals, Fire Proof Buildings &c.



End view of Muntins for Glazed Sash. End view of Muntins for Unglazed Sash. Patented June 9, 1874. Hollow Muntins.

## CINCINNATI.

Reported by Sellers & Co., Importers and Jobbers in Metals, No. 214, 216 and 218 Main street.  
 Oct. 10, 1876.

Tin Plate.—1. C. 10x14 Charcoal.....	10 50
1. X. 10x14 Charcoal.....	10 50
1. C. 12x14 Charcoal.....	11 00
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1. C. 12x632 Charcoal.....	88 50
1. X. 12x632 Charcoal.....	88 50
1. C. 12x636 Charcoal.....	89 00
1. X. 12x636 Charcoal.....	89 00
1. C. 12x640 Charcoal.....	89 50
1. X. 12x640 Charcoal.....	89 50
1. C. 12x644 Charcoal.....	90 00
1. X. 12x644 Charcoal.....	90 00
1. C. 12x648 Charcoal.....	90 50
1. X. 12x648 Charcoal.....	90 50
1. C. 12x652 Charcoal.....	91 00
1. X. 12x652 Charcoal.....	91 00
1. C. 12x656 Charcoal.....	91 50
1. X. 12x656 Charcoal.....	91 50
1. C. 12x660 Charcoal.....	92 00
1. X. 12x660 Charcoal.....	92 00
1. C. 12x664 Charcoal.....	92 50
1. X. 12x664 Charcoal.....	92 50
1. C. 12x668 Charcoal.....	93 00
1. X. 12x668 Charcoal.....	93 00
1. C. 12x672 Charcoal.....	93 50
1. X. 12x672 Charcoal.....	93 50
1. C. 12x676 Charcoal.....	94 00
1. X. 12x676 Charcoal.....	94 00
1. C. 12x680 Charcoal.....	94 50
1. X. 12x680 Charcoal.....	94 50
1. C. 12x684 Charcoal.....	95 00
1. X. 12x684 Charcoal.....	95 00
1. C. 12x688 Charcoal.....	95 50
1. X. 12x688 Charcoal.....	95 50
1. C. 12x692 Charcoal.....	96 00
1. X. 12x692 Charcoal.....	96 00
1. C. 12x696 Charcoal.....	96 50
1. X. 12x696 Charcoal.....	96 50
1. C. 12x700 Charcoal.....	97 00
1. X. 12x700 Charcoal.....	97 00
1. C. 12x704 Charcoal.....	97 50
1. X. 12x704 Charcoal.....	97 50
1. C. 12x708 Charcoal.....	98 00
1. X. 12x708 Charcoal.....	98 00
1. C. 12x712 Charcoal.....	98 50
1. X. 12x712 Charcoal.....	98 50
1. C. 12x716 Charcoal.....	99 00
1. X. 12x716 Charcoal.....	99 00
1. C. 12x720 Charcoal.....	99 50
1. X. 12x720 Charcoal.....	99 50
1. C. 12x724 Charcoal.....	100 00
1. X. 12x724 Charcoal.....	100 00
1. C. 12x728 Charcoal.....	100 50
1. X. 12x728 Charcoal.....	100 50
1. C. 12x732 Charcoal.....	101 00
1. X. 12x732 Charcoal.....	101 00
1. C. 12x736 Charcoal.....	101 50
1. X. 12x736 Charcoal.....	101 50
1. C. 12x740 Charcoal.....	102 00
1. X. 12x740 Charcoal.....	102 00
1. C. 12x744 Charcoal.....	102 50
1. X. 12x744 Charcoal.....	102 50
1. C. 12x748 Charcoal.....	103 00
1. X. 12x748 Charcoal.....	103 00
1. C. 12x752 Charcoal.....	103 50
1. X. 12x752 Charcoal.....	103 50
1. C. 12x756 Charcoal.....	104 00
1. X. 12x756 Charcoal.....	104 00



## THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacks durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

## Reduced Price List,

JANUARY 25th, 1876.

For dimensions of Governor, see Illustrated Price List.



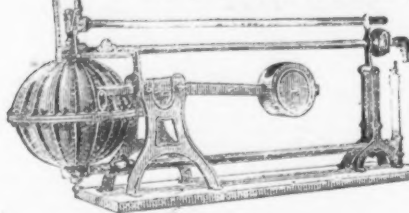
THE JUDSON PATENT Improved Steam Governor.

Size, Inch.	Plain.	Height, Inch.	Weight, Lbs.	Stop Valve.
1	\$17.00	\$19.00	\$1.00	..
1 1/2	21.00	24.00	2.00	25.00
2	25.00	28.00	2.25	30.00
2 1/2	29.00	33.00	2.50	35.00
3	35.00	40.00	3.75	40.00
3 1/2	42.00	48.00	4.25	45.00
4	45.00	51.00	5.50	50.00
4 1/2	49.00	56.00	6.75	55.00
5	55.00	63.00	8.25	60.00
5 1/2	64.00	73.00	10.50	65.00
6	74.00	84.00	13.00	70.00
6 1/2	86.00	97.00	16.50	75.00
7	94.00	106.00	20.00	80.00
7 1/2	112.00	125.00	25.00	85.00
8	125.00	138.00	30.00	90.00
8 1/2	150.00	165.00	38.00	95.00
9	185.00	202.00	48.00	100.00
10	205.00	225.00	60.00	..

No Charge for Boxing & Cartage.

JUNIUS JUDSON & SON, Rochester, N. Y.

## The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company, Albany, N. Y.

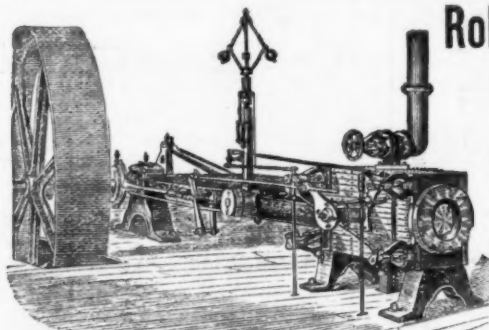
## The Pratt & Whitney Co.,

Hartford, Conn.,

Have constantly on hand and making

## Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



Robt. Wetherill & Co  
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Corliss Engine BUILDERS.

Shafting & Gearing, Boiler Makers.

## THORNE, DeHAVEN & CO., Drilling Machines,

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PORTABLE DRILLS. Driven by power in any direction.  
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.  
VERTICAL DRILLS. Self-feeding.  
MULTIPLE DRILLS. 2 to 30 Spindles.  
HORIZONTAL BORING AND DRILLING MACHINES.  
HAND DRILLS. CAR BOX DRILLS.  
SPECIAL DRILLS. For Special Work.

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Small Lathes for Steam or Foot Power. Designs and Drawings for Patent Office. Several Valuable Patents for sale.

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JOHN BARKER, Pattern and Model Department.

JAS. STARRETT, Machinery Dep't.

## C. SCOFIELD'S STRAIGHTENER OR BENDER,

For Shafting, Axles, Tubes, Rails, &c.

There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

### SCOFIELD PATENT SHAFT STRAIGHTENER

meets just such a want; the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

Adapted to Removing Short Bends,

which frequently occur in long lengths of shafting. The lightness of the straightener renders it eminently

Adapted for Line and Counter-Shafting, without necessitating the time and trouble of removing hangers and detaching couplings, but can be

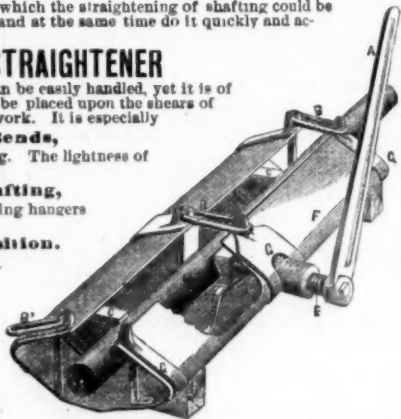
Easily applied to the Shaft while in Position.

It can also be used on the bench for short lengths.

For Circulars, Price List, &c., Address,

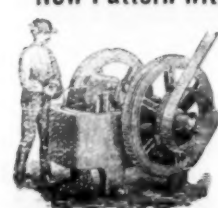
C. SCOFIELD & CO.,

Vineland, N. J.



## BLAKE'S PATENT STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect MACADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barites, Manganese, Phosphate Rock, Plaster, Soapstone, &c. For Illustrated Circulars, and particulars, address,

BLAKE CRUSHER CO., New Haven, Conn.

## Knowles Patent Steam Pumps

MANUFACTURED BY THE

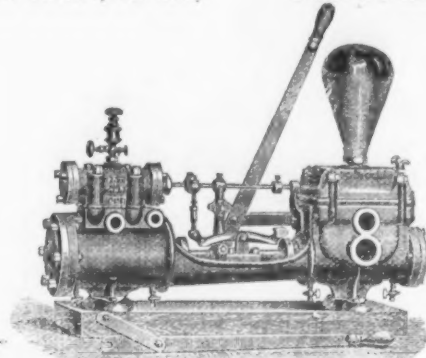
## KNOWLES STEAM PUMP WORKS,

WARREN, MASS.

WAREHOUSES:

14 & 16 Federal Street, Boston,

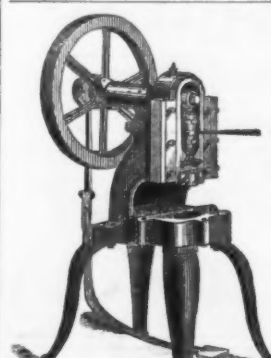
92 & 94 Liberty Street, N. Y.



Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

## FIRE PUMPS a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern,) which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best. Every machine furnished under a complete guarantee.



## A. H. MERRIMAN, Patent Power Punching Presses.

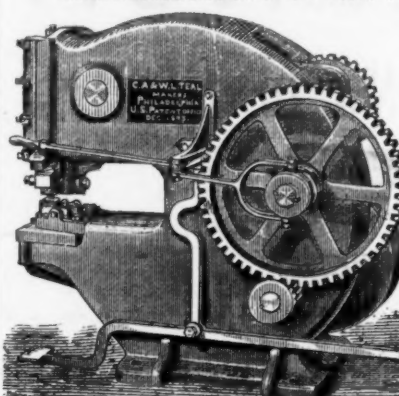
Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

West Meriden, Conn.

Machinery Hall, Philadelphia, Section B 4, Columns 28 and 29.

## C. A. & W. L. TEAL, Manufacturers of IMPROVED BENDING ROLLS



Arranged for Removing Work from the end of top roll.

### COMBINED

Punching and Shearing Machines, Single Power Punching Machines with Shearing Attachments, Rotary Shearing Machines, Steam Driveling Machines, "Atherton's" Patent "Cam," Steam Engines, Hair Picking Machines and

### MACHINERY

in general.

We would call special attention to the above engine, as it has the same leverage on the driving shaft as every point of the stroke that the "crank" has at its strongest point, making a smoother running as well as a more powerful engine.

4116 Ludlow St., Philadelphia.

CENTENNIAL SPACE, SECTION C. 3, COLUMNS 25 & 26, MACHINERY HALL.

## NORTHWESTERN

## HORSE NAIL CO.

ESTABLISHED IN 1862.

## HAMMERED AND FINISHED HORSE NAILS.

We offer our Finished Nail to the trade with the confidence that it has no equal in the market. It is the genuine "Northwestern" Nail, Finished, and we give it our unqualified guaranty.

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A. W. KINGSLAND, Secretary.

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MANUFACTURERS OF

## Pointed, Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

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## Celluloid Emery Wheel Co.,

Manufacturers of all kinds of

## Celluloid Emery & Corundum Wheels

FOR DENTAL AND MANUFACTURING PURPOSES.

One of the Strongest, can be run with or without water, and will not glaze under any circumstance.

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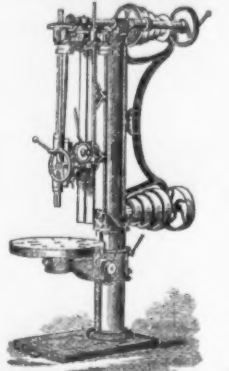
NEWARK, N. J.

Send for Price List and Circular.

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Manufacturer of the



"BLAISDELL" UPRIGHT DRILLS And other First-Class Machinists' Tools.



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Removed to 312 Greene St.,

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Engineers and General Machinists, and Manufacturers of Lathes, Drill Presses, and Special Tools to order.

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DEALERS IN ALL KINDS OF

### Lubricating Oils.

West Virginia Lubricating Native Rock Oil! Used by most of the Railroads in the United States, Canada and Europe, and by Mechanics on all kinds of Machinery. The Safest, Cheapest and Most Reliable Lubricator in the world. Obtained the Highest Prize at the Paris Exposition. 25, 30 and 50 Gravity. No. 36 CEDAR STREET, NEW YORK.

The Whitmore Engine. SAFEST, CHEAPEST & BEST. Lovegrove & Co., No. 121 South Fourth Street, PHILADELPHIA, PA. Sole Manufacturers of Engines, Boilers and Steam Pumps.

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Stubs' Tools, Files, Bright Round Steel Wire, Bar & Sheet Steel, &c.

### BEST PIERCING SAWS

For Scroll Sawing.

French, German, English & American TOOLS, FILES, STEEL WIRE AND SUPPLIES.

Agents for the

## ALMOND DRILL CHUCK.

## OHL & HAUSCHILD,

## Engineers & Machinists

And manufacturers of

Lathes, Shapers, Slotters, Planers, Gear Cutters, Drill and Power Presses, Pulleys, Hangers and Shafting, Machinery and Machinists' Tools in general.

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### COTTON GINS,

With or without

Self-Feeding Attachment & Condenser.

Cotton Gin Saws, Ribs and other Gin materials. Also

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279 Cherry St., near Jefferson St.

## ELEVATORS

For Hotels & Stores a specialty.

Machinery in General made to order.



Machinery, &c.

THE  
Shapley Engine

Patented Feb. 10, 1874.

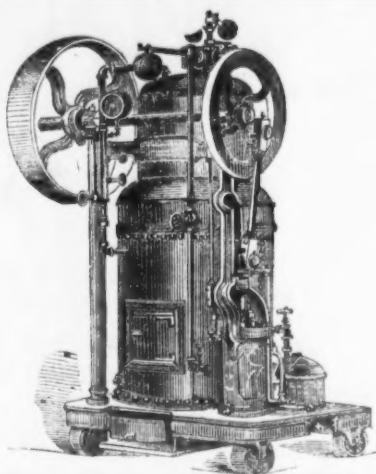
COMPACT,  
PRACTICAL,  
DURABLE,  
ECONOMICAL.  
\$200.00.

Cheaper than any Engine offered of  
the same capacity.

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SHAPLEY & WELLS,  
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Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and  
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Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or  
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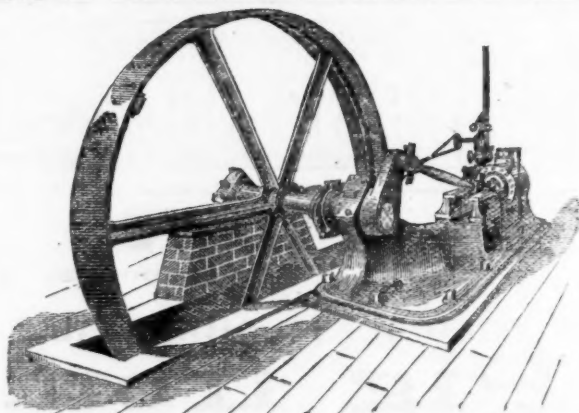
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Builders of STATIONARY AND MARINE

Engines, Boilers, Shafting, Gearing,  
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SPECIAL MACHINERY BUILT TO ORDER.



Vertical and Horizontal Engines, of New and Heavy Designs, from 2 to 100  
H. P. on hand, or in process of erection.

CENTENNIAL SPACE: Section B 9, Column 69, Machinery Hall.

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The 100 h. p. horizontal engine now in our space in Machinery Hall, and which took a premium, may  
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**Morse Twist Drill and Machine Co.,**  
NEW BEDFORD, MASS., Sole Manufacturers of  
Morse Patent Straight-Lip Increase Twist Drill,  
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.  
BIT STOCK DRILLS,  
Drills for Coes, Worcester, Hunter and other Hand Drill;  
Presses, Beach's Patent Self-Centering Chucks, Center  
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Drill Grinding Machines, Taper Reamers, Mill-  
ing Cutters and Special tools to order.  
All Tools exact to Whitworth Standard Gauges.  
GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.

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OFFICE, 81 Canal Street, Providence, R. I. WORKS at Valley Falls, R. I.  
Manufacturers of  
PERKINS and RHODE ISLAND PATTERNS of  
HORSE AND MULE SHOES.

Machinery, &c.

Established 1848.

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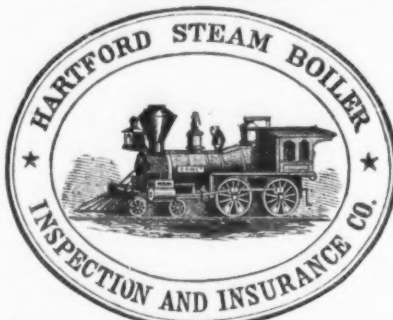
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Are of Improved and Patented Construction.

Railway Turning and Transfer Tables,  
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Full information concerning the plan of the Company's operations can be obtained at the

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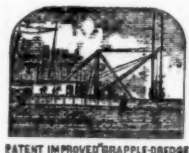
or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

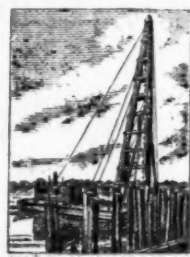
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BUILDERS OF STEAM DREDGING MACHINES,  
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Keystone Pressure Blowers.

Anti-friction and noiseless; maximum blast and minimum power;  
all sizes for

Forges, Foundries, Rolling Mills, &c.

KEYSTONE EXHAUST BLOWERS.

Made on same principle.

For Ventilating Mines, Buildings, etc.; Removing Dust,  
Shavings, etc.; Drying Wool, Lumber, etc. Every  
Blower guaranteed. Send for circular, or  
call and see them in operation.

KEYSTONE PORTABLE FORGE CO.,

120 Exchange Place, Philadelphia.

Also, sole manufacturers of the celebrated KEYSTONE PORTA-  
BLE FORGES, for all classes of work, from the lightest to the heaviest.



The C.O.D. Engine  
COSTS LESS

And is equal to any Engine in the market.

ALL WORKING PARTS WELL FINISHED.

No. 1, Cylinder 4x6..... \$125.00  
No. 2, " 5x7..... 150.00

MANUFACTURED BY

J. AUSTIN & CO.,

168 Fulton Street, New York.

Also, Proprietors and Manufacturers of  
Wheatcroft's Self-Adjusting Pipe Wrench,

AND  
SCRIPTURE'S FUNNEL TOP OILERS.

Machinery, &c.



REPORT OF JUDGES

In Department F, Group 3, at the 44th  
Exhibition of the

AMERICAN INSTITUTE,

Held in the City of New York, Oct., 1875

No. 318, Drawing, Drop &  
Punching Presses.

THE STILES & PARKER PRESS CO.,  
Of Middletown, Conn.

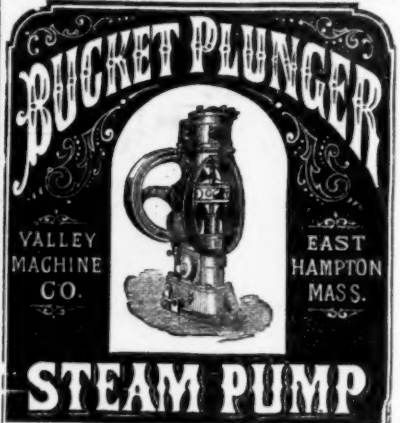
The machinery exhibited by these makers is of a  
character that calls for special commendation. In  
addition to their well known punching presses, to  
which a new feature has been added in a press ad-  
justable to an inclination for discharging work left  
above the die, there are exhibited by them a com-  
bined punch and shears, a drawing or blanking press,  
and a drop.  
In all these there is shown the highest mechanical  
culture, applied to meet every practical requirement,  
to avoid every practical difficulty, and to enlarge the  
range of application of the machines, by devices  
which are at once simple, elegant, and effective.  
Your committee would unhesitatingly recommend  
for this exhibition the "Medal of Progress," but  
find such award debarred by the rule of the Institute,  
forbidding such award unless a Silver Medal has  
been previously awarded. We, therefore, respect-  
fully recommend the award of a Silver Medal.  
Silver Medal Awarded.  
A true copy from the Report on file.  
JOHN W. CHAMBERS, Sec'y.

AQUOMETER  
Steam Pump.

Highest Premium awarded by  
Franklin Institute, 1874,  
For Simplicity, Economy of  
Construction & Efficiency.

An absolutely Durable, Cheap, Efficient and Eco-  
nomical Steam Pump. Requires no special care or  
lubricating. Warranted. Address for circular,

AQUOMETER STEAM PUMP CO.,  
10 South Dela. Avenue, Philadelphia,



EUREKA SAFETY POWER!

Practically impossible to  
explode. Tested to 300 lbs  
pressure per square inch. Will  
lift 3 inch seasoned oak—grind  
bushels Corn per hour. Price  
\$250. Also Stationary Engines  
and Boilers and Spark Arres-  
sing Portable Engines for  
plantation use. Send for our cir-  
cular. D.S. sent to the trade.

B. W. PAYNE & SONS,  
Corning, N. Y.



VOLNEY W. MASON & CO.,

Manufacturers of PATENT

FRICTION PULLEYS

Friction Clutches

For Connecting Shafting and Gearing.

ELEVATORS.

Lafayette Street, PROVIDENCE, R. I.



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760 South Broad Street, PHILADELPHIA.  
PAUL S. REEVES,  
MANUFACTURER OF

### ANTI-FRICTION METALS.

XXX Genuine .....	40c	C.....	20c
XX .....	35c	D.....	15c
X .....	30c	E.....	10c
A .....	25c	F.....	5c

\*Note.—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

BRASS CASTINGS, 21 to 35c. INGOT BRASS, 19 to 25c. BRASS TURNINGS AND OLD METALS WANTED.

ESTABLISHED 1842.

## WM. & HARVEY ROWLAND PHILADELPHIA,

P. O. Address: Frankford, Philad'a. MANUFACTURERS OF ALL KINDS OF

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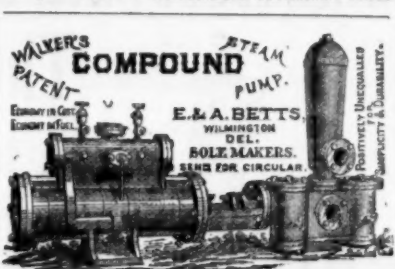
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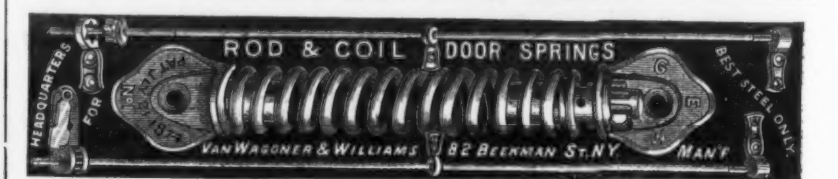
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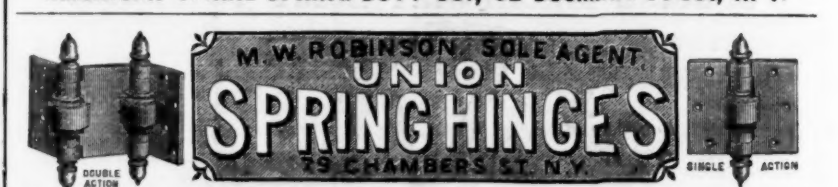
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